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and
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Editorial Director G. GEOFFREY SMITH, M.B.E.
Editor - - C. M. POULSEN
Assistant Editor - MAURICE A. SMITH, D.F.C. (WING CDR., R.A.F.V.R.)
Art Editor - - JOHN YOXALL

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The Outlook

For All to See

NEW uses for aircraft are rapidly being added to an already long list. Recent experiments in America appear to promise yet another. The idea itself is not new, but the success of tests made in connection with the Republican National Convention gives cause for believing that our go-ahead American friends will adopt and apply it before very long.

Stratovision is the name given to the scheme which, as we recorded in an article on September 6th, 1945, owes its origin to Mr. C. E. Nobles, of the Westinghouse Electric Corporation, and which has since been developed jointly by that firm and the Glenn L. Martin company. Briefly the scheme is to lift an aerial and a transmitter high into the air for the broadcast of television programmes.

On the occasion of the recent Republican National Convention, subsequent reports from "televiewers" showed that reception had been good over an area represented by a circle of more than 500 miles in diameter. The aircraft, a modified B-29, was flying at 25,000ft above Pittsburg, and the programmes were heard in nine States. They were picked up by the aircraft from two ground stations, one in Washington, D.C., and one in Baltimore, and rebroadcast.

Television is making slow progress in Great Britain, at any rate compared with the United States, and among the reasons for this is undoubtedly the very short range of a groundborne transmitter. It is estimated that a total of 14 Stratovision aircraft would be required to cover the significant parts of the United States. The British Isles are so small that even a single aircraft (assuming a transmitting range of 250 miles) would suffice for bringing television into homes as far apart as Cornwall and the southern parts of Scotland. Two machines would appear to be capable of ensuring reception from Land's End to John o' Groats or even the Scottish islands and portions of Ireland.

The American tests were an experiment, in which a modified B-29 was used, but the Westinghouse corporation has applied for the allocation of a channel for the first regular Stratovision station, and the Glenn Martin company has designs for a modified 2-0-2 which would be capable of flying in all weathers and would carry 7,000 pounds of equipment, including a crew of four. Perhaps we in this country could make good use of a few of the Tudors which no one seems to want. The cost should not be excessive, and the fact that the Tudor would be rather too large and powerful for the work need be no serious deterrent. A television aircraft should have 100 per cent reliability, circling at 25,000-30,000ft. This would be facilitated by flying at much less than full load and with the engines well throttled back. As the Martin vice-president said: "For once we are not trying to go anywhere in a hurry, but instead want to go nowhere slowly."

Explosive Exodus

PROGRESS in high-speed flying in the sonic and supersonic ranges must be regarded as good if one takes into consideration the many new and difficult problems which have arisen, and which continue to arise. We are slowly—very slowly—finding out what the airflow is like when a body moves at these high speeds. As knowledge of these phenomena increases, it becomes possible to estimate what sort of structures are necessary to withstand the loads imposed, and so the general form of future aircraft begins to take shape.

There is still the human aspect to be considered. The people most directly concerned in the early stages are the test pilots, who have to provide many of the answers which the designers require. Not a few have given their lives in that cause, and if such sacrifices are to be reduced to a minimum in the future, every effort must be made to provide the test pilots with effective means of escape when things go wrong. One such life-saver

is the ejector seat, an example of which is described in this issue. The Martin-Baker has been very thoroughly tested, and was demonstrated at the recent Gatwick Display. It goes a long way towards providing the pilot with a means of escape, but as aircraft speeds go up and approach Mach numbers of 1 or over, even this clever device may prove inadequate.

America has done a good deal more piloted high-speed research flying than we have, and the subject of pilot-safety is being given considerable attention. At the annual summer meeting of the Institute of the Aeronautical Sciences in Los Angeles, two Douglas test pilots gave their views. Gene May, who has done all the research flying on the D-558 Skystreak, dealt with many aspects of high-speed flight, and on the subject of escape he expressed himself in favour of the jettisonable cockpit, while Russell Thaw suggested that for speeds at Mach number around 2, the pilot should be housed in a cell unit capable of being projected away from the aircraft by the pressing of a button, and provided with a parachute large enough to land the cell at a reasonable impact speed.

The difficulties of achieving this would obviously be very great indeed, but the problems must be given very serious consideration, not only for the benefit of the test pilots who have to make the early flights but for the fighter pilots who will follow.

Nationalization ?

POLITICAL circles have recently been discussing a rumour that certain sections of the community are preparing a drive for the nationalization of the British aircraft industry. So far, the advocates of such a policy have not come out into the open, but to be forewarned is to be forearmed. It is easy enough to assess the quarters from which such a suggestion would be likely to come, but it is to be hoped that the Government will be strong enough to resist giving in to the demand, if and when it is voiced.

To the half-instructed it would appear entirely logical that since civil aviation is already nationalized, and since the main customer of the aircraft industry for military aircraft is the Government, nationalization would be a natural step.

There is, of course, only a superficial similarity between the two cases. Civil aviation, by its very nature, is largely international, and international regulations have to be agreed at Government level. Consequently a case for nationalization could be made out—and was.

Manufacture of aircraft is, however, a very different problem. Few of those who now urge nationalization are probably old enough to remember the early days, when the Royal Aircraft Factory (now the R.A.E.) at Farnborough competed with the industry. The result was not happy. Times have changed, but initiative and efficiency are still the great essentials, and nationalization is not calculated to encourage either.

Memories are inclined to be short, and for the benefit of those who have by now forgotten what happened in France a few years before the war, it may be recalled that when the French aircraft industry was nationalized, aircraft production almost vanished, so that France started the war with a pitifully small number of modern aircraft.

Let the lesson of what happened in France be taken to heart.

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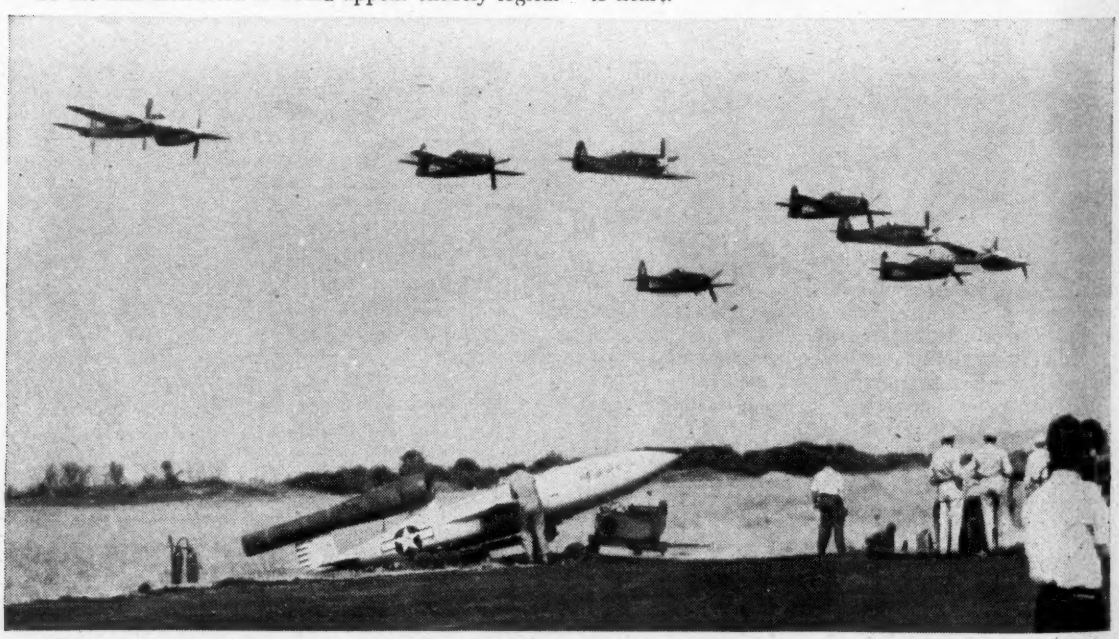
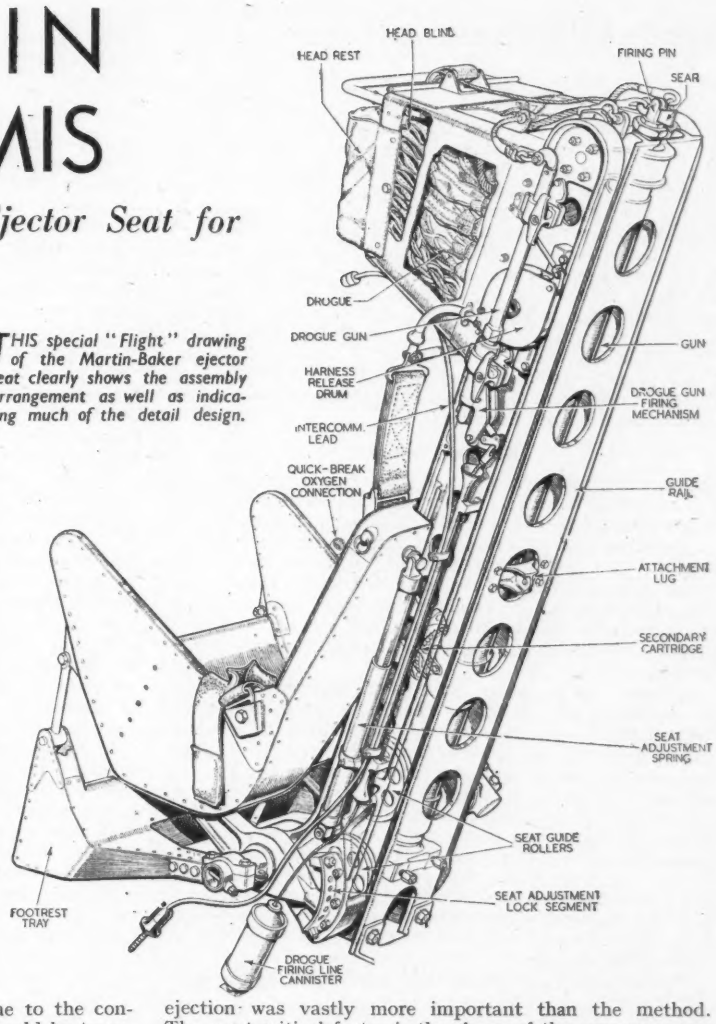


SPLICED : *Grumman Bearcats of the U.S. Navy get together with de Havilland Sea Hornets and Hawker Sea Furies of the visiting British squadron on the last day of the International Air Exposition in New York. Our pilots found many kindred spirits among the Americans. A development of the Fi 103 ("V-1") flying bomb seen in the foreground puts Germany in the picture.*

EXIT IN EXTREMIS

Latest Development of Ejector Seat for High-speed Escapes



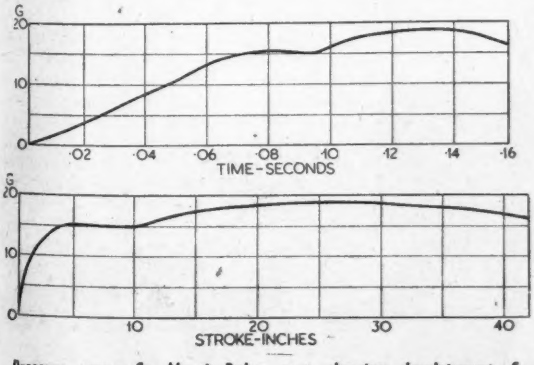
THIS special "Flight" drawing of the Martin-Baker ejector seat clearly shows the assembly arrangement as well as indicating much of the detail design.

WHAT the general attitude of mind toward taking to a parachute is among the pilots of high-speed aircraft we have no reliable means of assessing, but no doubt if faced with sufficiently stark an alternative, no one would, perhaps, hesitate unduly about getting out. As a physical operation this is reasonably easy, providing one is not travelling too quickly: however, when flying at the most modern speeds, there is a very real intrinsic difficulty in leaving the aircraft.

Even in straight and level flight, if moving at anything much above 400 m.p.h., wind resistance is of such magnitude that, even if it is possible, with difficulty, to leave the cockpit, there is the distinctly unpleasant likelihood of being dashed against the fin or tailplane as it goes past; an event which could easily prove lethal. If, however, there is any deflective acceleration on the aircraft itself, it might be impossible to climb out, due simply to not having sufficient strength.

Problems of escapology were studied quite intensively during the war by Martin-Baker Aircraft, Ltd., and they came to the conclusion that the only way in which a pilot could be transferred into the open air quickly, cleanly and without argument with his aircraft, was to "shoot" him out.

The mechanics of such an operation can be said to be relatively simple but the fact that the freight is human does introduce difficulties. The *corpus homo* is a wonderful shock absorber and is capable of taking an immense amount of punishment; however, there are limits, and Martin-Baker found quite early on that the manner of ejection was vastly more important than the method. The most critical factor is the shape of the pressure curve in terms of g developed against time, and it is far more important that the curve should be linearly progressive so that the increment of acceleration is substantially uniform, rather than that a very large initial impulse should be administered which then rapidly tails away.



Pressure curves for Martin-Baker seat, showing development of acceleration against time and against gun stroke.

The curves in the accompanying illustrations clearly show this point. The maximum g developed with the M-B seat is 18.75, this occurring approximately $\frac{1}{8}$ of a second after firing. Although $\frac{1}{8}$ of a second can be regarded as a very short interval of time, it is a matter of degree, for other ejector seat experiments have shown pressure-curve slopes so steep as to indicate initial acceleration being applied at the rate of 600 to 700 g per second. Such an acceleration as this imposes a quite unacceptable impact on the human body, which would certainly damage the vertebrae and, incredible though it may seem, is also insufficient to throw seat and pilot clear of the aircraft. On the M-B test tower, an ejection with a tremendous initial peak acceleration of this kind lifted the seat only 20ft, whereas the company's own seat, fired with a progressive acceleration to a peak of only 18.75 g, is lifted 80ft. The slope of the pressure curve for the M-B seat is such that the maximum rate of acceleration applied is under 200 g per second; in fact, the total time of the expulsion stroke is only approximately $\frac{1}{4}$ of a second.

It might well be imagined that imposing an acceleration of even 18.75 g on the human body would result in something pretty terrifying in the way of black-out, but in actual

Exit in Extremis . . . . .

fact, nothing of the kind occurs. Black-out is caused by imparting an acceleration to the blood, tending to cause it to drain from the eyes and brain and, if the acceleration is maintained for a sufficiently long time, temporary loss of sight will occur, followed in extreme cases by unconsciousness. The criterion of this effect is, of course, time. In common with all matter, blood has inertia, and if a force is applied sufficiently long for inertia to be overcome, then the blood will start to move. Thus it is that, if a (relatively) mild acceleration of, say, 5 g, is imposed for longer than about five seconds, black-out will be experienced. It is just this quality of inertia that prevents black-out occurring in the ejected pilot, for although the force applied is over 18 g, the period of application is only $\frac{1}{8}$ of a second, and in so short a period its inertia prevents the blood moving unduly—that is, of course, aside from its normal function of circulation.

Series Firing

This smooth progressive acceleration is achieved by firing two cartridges in series. When the main cartridge is fired, it produces a progressive acceleration reaching a maximum of about 15 g in a period of a little under 0.1 seconds. During this time, the seat is moved 10 in on its run, at which point the blast of the main cartridge breaks a diaphragm and ignites the auxiliary cartridge. This increases the acceleration slightly to 18.75 g, and sustains it until a period of about 0.14 seconds has elapsed from the initial ejection action.

A measure of the progressiveness of acceleration is given by movement against time. The first 10 in of movement takes roughly $\frac{1}{10}$th of a second, but during the second $\frac{1}{10}$th of a second, i.e., making the total period $\frac{1}{5}$th sec, the seat moves a further 32 in (the total gun stroke being 42 in) and at the time the seat leaves the gun it is travelling at a speed of 60 ft/sec, that is, just over 40 m.p.h. The only reason for using two cartridges in series is to obtain a progressive push. The same thing could be achieved with a single cartridge if the rate of burning were sufficiently slow; this, however, has proved to be difficult to arrange with any degree of reliability, and the two-cartridge system is by far the more practical, especially as there are no inherent drawbacks.

This twin-cartridge scheme has been tested on the ejection seat test tower with a load in the seat equalling $5\frac{1}{2}$ g. These conditions were obtained by means of long elastic cords running over pulleys at the base of the tower and tensioned by chain blocks until the load equalled 1,100 lb, that is, $5\frac{1}{2}$ times 200 lb. Under such a test, the pressure curve showed only very slight variation from the curve obtained with the 1 g condition. This test is important in showing that a successful ejection could be made without difficulty with a pre-load acceleration of $5\frac{1}{2}$ g imposed on the aircraft, such as might apply if the machine suddenly changed direction during the period of ejection.

Seat chassis, guide-rail and gun, all form a self-contained assembly which can simply and easily be installed in the aircraft. One of the features which all Martin-Baker products have in common is design for maintenance expediency, and the ejection seat has this quality in good measure.

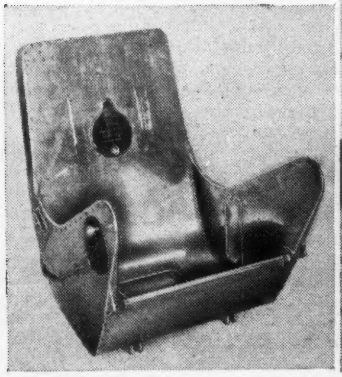
The guide-rail is a box-form structure, down the centre of which is housed the gun. The rail can be attached to the aircraft either by holding-down bolts at the feet, or by lateral bolts picking up to the webs. The upper attachment can be of the most suitable kind, for the particular aircraft installation, which will look after the crash-condition stress requirement of 25 g. The heel of the gun registers with a base block in the foot of the guide-rail, being locked there by a simple spring-loaded latch, whilst the top of the gun registers in a cross-head spanning the top of the seat frame, the anchorage in this case also being by means of a simple latch mechanism. A quadrantal frame is fitted around the gun cylinder about 3 in below the head to ensure concentric location in the guide-rail box structure. Thus the guide-rail is anchored to the aircraft, the gun is anchored to the guide-rail and the seat is anchored to the gun. When speaking of the gun, it will be convenient to refer to the "bullet" as being part of the gun, for it is to the "bullet" that the seat is attached.

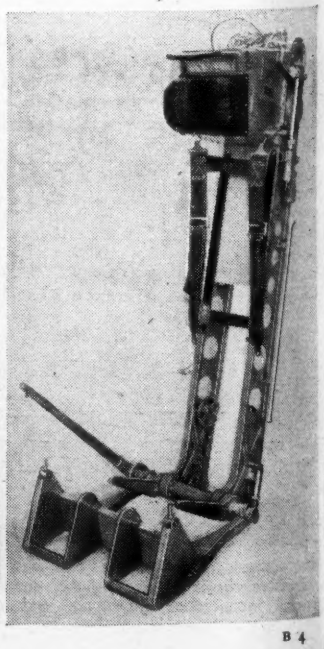
A simple cylindrical barrel forms the gun and houses a tubular "bullet." At the base of the barrel is threaded a heel block comprising a spring-loaded piston axially contained within a twelve-segment chuck. The upper ends of the chuck segments are under-cut on the outer diameter to engage a shoulder in the mouth of the "bullet" tube. This effectively locks the "bullet" to the gun which, as already mentioned, locks the seat to the aircraft. When the main cartridge is fired, gas pressure forces the piston in the heel block down against a spring, so allowing the chuck segments to close radially inward and thus free the "bullet" to move from the gun.

(Centre) Having drawn back his feet into the foot rests, the pilot pulls down the blind over his face and so fires the gun to eject himself, complete with seat, clear of the aircraft.

(Right) Chassis with seat pan removed to show frame structure. Note the guide rollers at the base of the frame members.

(Below) The seat pan is a very light but immensely strong fabrication of light alloy sheeting.





The main cartridge is housed against a light ejecting spring in the head of the "bullet" beneath a threaded plug incorporating the firing body. This is simply a heavily spring-loaded firing pin, which is released by withdrawing a sear. Conventional piston-type gas control rings are fitted to the skirt of the "bullet" and effect a seal between the "bullet" and the barrel. Ten inches up the barrel are vent holes to the diaphragm of the auxiliary cartridge and, when the "bullet" uncovers these holes, gas pressure bursts the diaphragm, and ignites the second cartridge. The propellant used, both in the main and secondary cartridges, is nitrocellulose and, for the main cartridge, a conventional detonator cap is employed.

Two I-section beams form the chassis, or seat frame. At their base are four wheels of about 3½ in diameter which engage the guide-rail. Laterally spanning the base of the frame beams is a cross-tube from which project two horn levers which carry the seat pan. At the top of the seat back-rest are small runner blocks which engage trackways in the frame members. By this means, vertical adjustment of the seat is obtained to accommodate varying lengths of back, the head position being fixed according to the aircraft's designed "constant sight line." A neat detail point is that the seat adjustment handle normally lies snugly against the seat side, but can be pulled away from the side against a light spring when adjustment is required.

Protection

The seat pan has peaked thigh-valances to prevent the legs from side movement and the pilot sits *in* the seat. On the starboard valance is a knob controlling the seat harness, which accordingly can be loosened to permit the pilot 10 in of forward movement with spring return against a ratchet. Z-type harness is fitted which, in common with the seat, is stressed for accelerations up to 25 g.

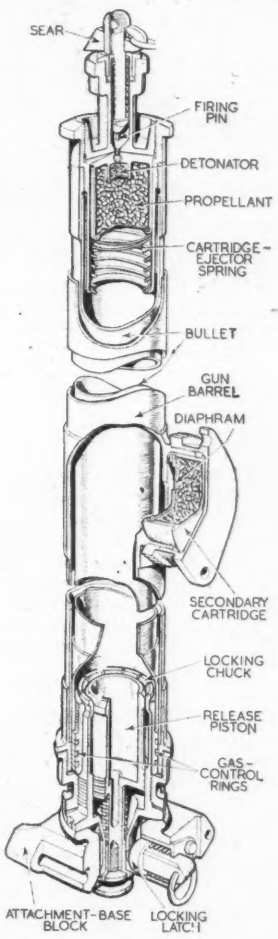
We have referred to the fact that the pilot might have to leave his aircraft whilst an overall acceleration is present. In these circumstances, it might well be difficult for him to lift his feet from the rudder pedals against g in order to tuck them back into the seat foot rests. To overcome the necessity for this, the seat foot rests are pivoted on the same cross tube as the seat itself so that they always remain in contact with the cockpit floor, irrespective of seat position. Telescopic struts between seat and foot rests provide limit stops. All that the pilot has to do prior to taking ejection action is to draw up his legs, allowing his feet to slide back along troughs from the rudder pedals to the seat foot rests.

At the head of the seat frames is a trapezoidal box, on the forward face of which is fitted the padded leather head-rest. Immediately behind the head-rest is stowed the face blind, and inside the box itself is housed the drogue. This is a miniature linen parachute of 24 in diameter and is attached to the seat by twelve 1,200-lb nylon shroud lines which are gathered into threes and plaited to form a four-strand cable. The purpose of the drogue is to act as an "air-anchor" and slow down the speed of the seat so that the pilot can leave it merely by undoing his harness and rolling forward.

To ensure that the drogue is not pulled out until the seat is well clear of the aircraft, a 20 ft static line is employed. This is packed into a small canister, bolted to the cockpit floor close to the base of the port main frame. The line is led through a fairlead tube up to a toggle linkage incorporating a spring-loaded sear. When withdrawn, this fires a small cartridge in the drogue-gun to expel a "bullet" in the shape of a small heavy tube which is attached by 2 ft of line to the crown of the drogue. Thus, when the seat has travelled the first 20 ft of its ejection course, the drogue-gun is fired, the drogue is pulled out and the seat is slowed down. The drogue-gun is mounted in quick-release clamps on the port main frame immediately behind the drogue box.

The face blind is an essential feature of the Martin-Baker seat and is so shaped as to ensure that the pilot's head is not only pressed firmly against the head-rest but is also restrained from sideways movement. The pilot's ejection drill is to jettison the hood, draw back his feet into the rests, and reach up with both hands, firmly grasp the handle above the head-rest and pull down the blind over his face. The blind is cable-connected to the sear of the gun firing pin; the final inch of blind travel withdraws the sear, the gun is fired and the seat ejected. Holding the blind down over his face ensures that the pilot's hands and arms are in the most convenient position for the ejection operation.

On the score of breaking ancillary connections the pilot has nothing to worry about. His intercomm. plug is arranged on the port side of the seat near the floor so that it readily pulls free when the seat leaves the aircraft, and the oxygen trunk from his face mask is carried to a quick-break connection on the starboard side valence of the seat. Since, however, ejection may well have to take place at 40,000 ft and above, a small emergency bottle of oxygen is carried behind the drogue box, on the starboard main frame, with a small-bore pipe to the pilot's face mask. A static line to the cockpit floor automatically turns on the emergency bottle as the seat leaves the aircraft.



Cut-away section through seat-gun, showing twin cartridges and details of firing, release and attachment mechanisms.

Standard Equipment

After a considerable period of painstaking development the Martin-Baker seat has been established by an extensive programme of factual tests to be far in advance of anything else of its kind existing. During the recent war the Germans devoted a certain amount of attention to the problem, but either they were hard-pressed or discouraged, for their efforts in seat ejection have been carefully tested and found to be wanting in several respects. Production Meteor IV's and all future high-speed aircraft for our Services are to have the Martin-Baker seat as standard equipment. Many foreign governments, not least among them that of the United States, have evinced considerable interest in this development.

AUSTER A.2/45

FOLLOWING the Auster A.O.P. Mk. 6, as used by Great Britain, Canada and other countries, and the Auster T. Mk. 7 Trainer (described in *Flight*, of July 8th, 1948), comes the A.2/45, the prototype of which is expected to appear at the S.B.A.C. Display next month. Features of the design, which, considering the nature and duties of the aircraft is commendably clean, are a wide-track undercarriage, designed to allow a very high rate of descent, and a good all-round field of view. Performance figures may not yet be quoted, but it is obvious that, with a crew of only two, the 250 h.p. Gipsy Queen engine should give a very useful speed and rate of climb.

It is understood that the possibility of maintenance in the field has been borne in mind, and that the aircraft has therefore been made unusually simple and accessible for servicing. The span is 43ft 6in, length 30ft 11in and wing area 278 sq. ft.

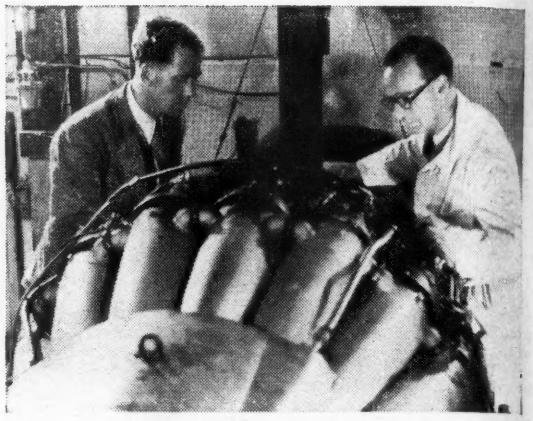
Goblin Put to The Test

234 Test Cycles of 65 Minutes Each: Oil Consumption Less than One Pint per Hour

MANY people will now be aware that the Ministry of Supply, through the instigation of Sir Alec Coryton, Controller of Supplies (Air), has initiated an endurance test programme for turbojets and turboprops which seeks to substantiate claims for this type of power unit, and at the same time to disprove certain criticisms that have been made with regard to reliability and servicing requirements. Following the successful and highly commendable 500-hour run by the Bristol Theseus, a standard de Havilland Goblin II has been picked at random from the production line, subjected to the severest test yet attempted by any aircraft power unit, and has passed with distinction.

The test programme was devised to simulate a very large number of operational flights such as the Goblin might be expected to undertake as the power unit of the standard Vampire fighter, and in all 234 test cycles, each of 65 minutes' duration, and separated by ten-minute non-running intervals, were completed. Each cycle was made up as follows:—

(a) Start and run at ground idling speed of 3,000 r.p.m.	1½ min.
(b) Taxying at 5,000 r.p.m., including three accelerations from 3,000 to 7,000 r.p.m.	5 min.
(c) Maximum take-off at 10,200 r.p.m. (3,130 lb static thrust)	1½ min.
(d) Maximum climb at 9,700 r.p.m.	5 min.
(e) Maximum cruising at 8,700 r.p.m.	35 min.
(f) Combat at 10,200 r.p.m.	5 min.
(g) Descent at 7,000 r.p.m.	7 min.
(h) Taxying as at (b) above	5 min.
(j) Stopped	10 min.
	1 hr. 15 min.



The D.H. Goblin on its test bed at Hatfield.

Unlike other engines which have undergone somewhat similar test runs, the Goblin completed the 234 "flights" (between July 8th and August 5th) without any maintenance or attention whatsoever, and its performance at the end of the period was the same as when the tests began. In coming through this most severe trial so successfully, the Goblin used up 81,000 gallons of kerosene and only 28 gallons of lubricating oil—less than one pint per hour. It was a production unit similar to those supplied to the Royal Air Force, Royal Canadian Air Force, Royal Swedish Air Force, Royal Norwegian Air Force and Swiss Air Force.

HERMES HIERARCHY

THERE are no fewer than six types of Handley-Page Hermes now listed, and some brief details of the latest piston-engined variant, the Mk. VI, have been released. An earlier reference was made to this mark in *Flight* of July 29th, 1948.

Hermes I is the civil equivalent of the Hastings military transport.

The Mk. II is a development with longer fuselage and used for research.

The Mk. III, a design which has been superseded, was the gas-turbine-powered counterpart of the Mk. II.

The Mk. IV, which is now ready to make its maiden flight, is the greatly improved nose-wheel version, fully pressurized and ordered for B.O.A.C.'s Empire routes.

The Mk. V, which is similar to the IV, but is powered with Bristol Theseus turboprops, is scheduled to fly early in 1949. Two prototypes have been ordered by the Ministry of Supply.

The Mk. VI is a direct development of the Mk. IV.

There has been a considerable reduction in structure weight in the case of the Hermes VI. This has resulted in a payload increase of over 2,500lb, and provision has been made for the carriage of a ton of extra petrol. New high-efficiency flaps, together with a large fin and rudder, are expected to improve the take-off and low-speed handling, and the thermal de-icing system for the wings and tail surfaces, and electrical de-icing for the airscrews, will ensure all-weather safety. Figures which differ from those for the Hermes IV are:—

Rate of climb at S.L.	1,080 ft/min
Payload for 2,000 miles	15,800lb
Max. capacity payload for 40-seater	12,752lb
Max. range	3,940 miles

An elaborate mock-up of the Hermes IV interior is illustrated and described on pages 214 and 215. After being approved by B.O.A.C. the seats and fittings are being transferred to the first aircraft which is to be shown at Farnborough.

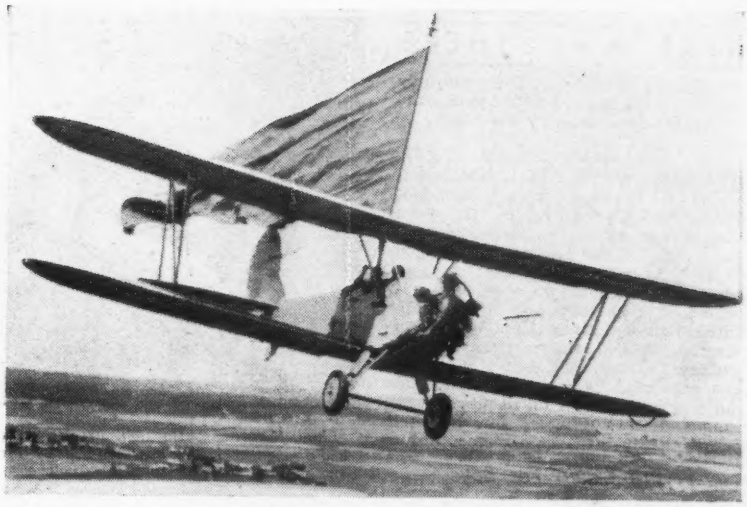
PILOTS' AND NAVIGATORS' LICENCES

INTRODUCTION of the Flight Navigator's Licence and the new categories of Pilots' Licences, details of which were published in *Flight*, July 22nd, have been further delayed. Examinations on the existing basis for both navigators' and pilots' licences will continue to be held in the meantime. Details of class of examination and centre, together with commencing dates of examination and closing dates for application, are contained in Notice to Airmen No. 285. To assist candidates in preparing for the examinations for the new licences, advance copies of the syllabi relating to flight navigator's licence, commercial pilot's licence (flying machines), senior commercial and airline transport pilots' licences, and instrument rating are now available, on application, to the Ministry of Civil Aviation, P.M.F. 1(a), Aerial House, Strand, London, W.C.2.

LOCATING ENGINE DEFECTS

ACCORDING to Pan American Airways, power plant troubles account for as much as 84 per cent of basic delays in flight departures. With the object of reducing these delays the company is planning to equip 20 Stratocruisers with engine analysers ordered from the Sperry Gyroscope Co., of New York, at a cost of £17,500. These engine analysers will, it is claimed, enable flight engineers to keep a close check on the correct functioning of each engine during flight and, should ground maintenance be required, report the exact nature and position of the faulty component to the ground staff on landing. It is considered that the conventional methods of diagnosing faults on the ground are out of date and the need for scientific "trouble-shooting," as the Americans call it, on large engines, has led to the development of the Sperry engine analyser; it enables a flight engineer, for instance, to check any of the 224 sparking plugs in a Stratocruiser in the few seconds required to manipulate two knobs. Pan American is confident that this item of equipment will earn its initial cost in six months by halving the time spent on ground maintenance of engines.

HERE AND THERE



FLAG DRAG : A ten-metre Red Flag was unfurled from the improvised flagstaff of this Pc-2 during the Aviation Day ceremonies at Moscow recently.

More Safirs for Ethiopia

A CONTRACT for a batch of six Saab Safirs has been signed by the Imperial Ethiopian Air Force. Deliveries are expected to start early in September, and when completed will bring the number of Safirs belonging to the Ethiopian Air Force up to 12; the first six were delivered during the winter of 1946. Count Carl-Gustaf von Rosen, C.-in-C. of the Ethiopian Air Force, will travel to Sweden at the end of August taking with him a number of cadets who will fly the six new Safirs to Addis-Ababa.

Free Holiday

MR. P. L. SMITH, winner of the first Queen's Cup competition which took place at the Northern Heights Model Flying Club's gala, reported in *Flight*, June 24th, will be flown from Gatwick airport on September 3rd for a holiday on the Continent; this holiday, part of the first prize for the Queen's Cup contest, has been donated by the directors of Hawker Aircraft, Ltd. Count Bagneux, owner of a famous castle at Du Repos, near Flers, has offered to accommodate the winner during his stay. A model flying meeting will be held at Flers on September 5th.

Mach Revaluated

THE sweeping-back of wings and other surfaces as a means of raising the critical Mach Number of high-speed aircraft is exemplified in new American fighters and bombers. A Supermarine "Sweepbacker" was illustrated in *Flight* of October 23rd, 1947, and last week the existence of a swept-wing version of the Hawker P.1040 and N.7/46 jet fighters was disclosed in the press. Contrary to reports, however, this machine—designated E.38/46—will not appear at the S.B.A.C. display.

Turboprop Power Output

IN a recent article describing the Napier Naiad, comparative power figures were quoted for the Dart and Mamba which might have been misleading in so far as two figures were for equivalent b.h.p. and the third for s.h.p. The maximum power figures are, in fact, as follows: Naiad 1,500 s.h.p. + 241 lb thrust; Dart (civil unit as fitted to the Viscount) 1,000 s.h.p. +325 lb thrust; Mamba 1,010 s.h.p. +307 lb thrust; all under sea-level static conditions. Respective overall diameters are 28in, 32in and 29½in. Power figures for the latest Darts have not been released, but it is reported that the Mamba II has given over 1,400 equivalent s.h.p. on test.

Maj. Gen. L. W. Johnson who has been appointed C.O. of the American B.29 units now in the U.K.

Smiths-Waymouth Gauges

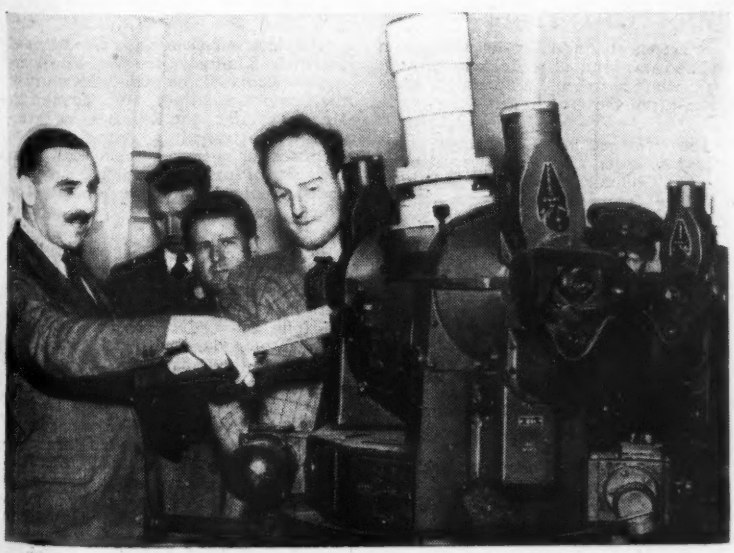
AN agreement has recently been concluded between Smiths Aircraft Instruments, Limited, and Waymouth Gauges and Instruments, Ltd., by which Smiths acquire the sole selling rights of Waymouth fuel contents gauges. In future the equipment, the operation of which depends on the varying capacitance of condenser elements in the fuel tanks, will be known as Smiths-Waymouth electrostatic fuel contents gauges. The engineering, production and technical staffs of the two companies have been collaborating for some time, and their resources have been combined to produce a complete range of equipment.

R.A.A.F. Help Offered

TEN Dakota transport aircraft to augment the Berlin lift have been offered to the British Government by Australia, and will shortly be flown over by R.A.A.F. crews. The aircraft are to be drawn from 86 Transport Wing, which has 24 of the type, only a few of which are in use.

Air Piracy

PROBABLY the first recorded case of piracy in the air occurred last month when a gang of four attempted to seize a Catalina flying-boat whilst it was flying from Hong Kong to Macao. The Catalina, owned by Cathay Pacific Airways, crashed into the sea 40 miles from Macao



ROCKET RANGERS : Examining an Askania kine-theodolite, used for plotting the flight of rocket missiles over the Woomera rocket range in Australia, are Mr. W. A. Butement, Chief Scientific Officer of the Long-range Weapons Project, and Mr. C. Bayley, scientific officer. Woomera is 240 miles north-west of Adelaide and commands a 3,000-square-mile prohibited zone.

HERE AND THERE

with the loss of 26 lives. There was only one survivor, a member of the gang, who subsequently confessed to the attack.

Invitation to Oslo

SPONSON DEVELOPMENTS, Ltd., of 3, Albemarle Street, London, W.1, have been invited by the Aero Club of Norway to exhibit models and photographs of the Tribian, described in *Flight*, July 29th, at the aero show in Oslo from September 5th-11th, and it is understood that they will be the only British representatives there. The firm recently acquired the services of Mr. Geoffrey Dorman, A.R.Ae.S., who has been appointed publicity manager, and who is responsible for all display advertising and news releases. Mr. Dorman was previously manager of Airco, Ltd.

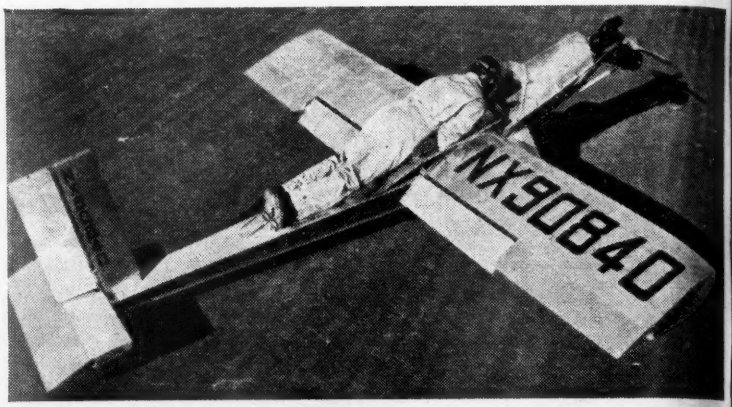
Flying Camp For Boys

ON August 7th boys from fourteen counties assembled at Shoreham airport for a two-week flying camp organized by the Air League of the British Empire in association with the annual training camp of a University Air Squadron. This is the first camp of the kind organized by the Air League, and was attended only by boys below cadet age (15½ years). It represents an experiment which may lead to bigger camps of the same sort in years to come, and is intended to encourage boys to join the A.T.C. when they reach the required age.

Rubber for Heating

AN interesting development in the field of rubber research is the manufacture of electrically conductive sheets which can be used as heating panels in the construction of aircraft cabins and other passenger vehicles. Reversing the conventional insulating properties of rubber, this specially compounded grade becomes a heating element when suitable electric supply is connected to it; sheets of this conductive rubber are rendered safe for interior furnishing panels by being "sandwiched" between layers of normal, insulating rubber. This method of building-in heater panels has been used successfully in aircraft in America on 24-28 volt electric circuits. The inclusion of a sheet of aluminium foil in the "sandwich" ensures that the heat is directed inwards to the compartment. Conductive rubber heats up to about 115 deg F and has a resistivity of one to two ohms/cm.

DIVING TRAINING: A recent photograph of G/C. E. M. Donaldson, R.A.F., who in 1946 raised the world's speed record to over 600 m.p.h., shows him being helped on with diving equipment during training for an attempt on the world's deep diving record.



AERIAL MATTRESS: This light aircraft, which has a wing span of 15 ft, a length of 13 ft, and a weight of 150 lb, has been built by three employees of an American aircraft company. The pilot lies prone on top of the fuselage secured by a harness, and reaches the controls through two armholes. A speed of 80-90 m.p.h. is hoped for.

News in Brief

LORD PAKENHAM, Minister of Civil Aviation, recently made an aerial tour of airports in Scotland and Northern Ireland.

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It is probable that the U.S.A.F. will use the 30 Northrop B-29 8-jet Flying Wings, now on order, for reconnaissance.

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A licence to build Gloster Meteors in Holland was granted to Fokkers on Aug. 11th, who are to build a number of these aircraft for the Dutch Air Force.

* * *

The Norwegian Government has placed an order for a "substantial number" of Goblin-engined Vampire fighters with the de Havilland company, it was announced on August 12th.

* * *

Air hostesses on Qantas Constellations on the London-Sydney route are now issued with two types of uniform to suit local climatic conditions.

* * *

Mr. A. C. McEvoy has joined Sangamo Weston, Ltd., Cambridge Road, Enfield, Middlesex, as Publicity Manager, the appointment taking effect from the beginning of August.

* * *

When an R.A.F. York force-landed at Desford with an engine on fire it broke its back. The crew of six escaped, the only injury being a cut on the finger of a flight sergeant.

Imir Abdulla al Faifal, the son of the King of Saudi Arabia, on August 17th flew to Paris by B.E.A. taking with him three attendants and 5 cwt of baggage.

* * *

An American Naval Squadron, consisting of three cruisers, a tanker, an aircraft carrier and four destroyers, passed through the Straits of Messina on August 12th, sailing a southerly course.

* * *

Mr. E. E. Little, a director of Bell's Asbestos and Engineering, Ltd., of Slough, has retired after 60 years' service with the firm. He has served with four generations of the Bell family since joining the firm as an office boy in 1888. Five years ago he was made a director of the company.

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The U.K. agents for Saab, R. K. Dundas, Ltd., announce that the Scandia, which will be at Gatwick on a demonstration tour tomorrow, August 20th, as reported in *Flight*, August 12th, will be open to inspection by members of the industry for the whole day. Those interested are invited to get in touch with R. K. Dundas if they wish to take advantage of the facilities offered.

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The Airscrew Company, Limited, and Jicwood, Limited, of Weybridge, recently celebrated the 25th anniversary of the firm's foundation. Accompanied by Mr. J. D. Titler, the chairman, an excursion was arranged by special train to Southsea for over 700 employees. Upon their return from the excursion a reunion dance was held in the works canteen at Weybridge.

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For the annual conference of the International Red Cross organization a party including Lord and Lady Woolton flew with B.E.A. from Northolt to Stockholm. Sir John and Lady Morris and A. Cdre. Hewett, together with Dr. and Mrs. Routley of the Canadian Red Cross, were among the party.

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Subject to the satisfactory completion of annual training, volunteer members of the R.A.F.V.R. and R.Aux.A.F. are to have their annual bounty increased to £12; it was previously £8. Proportionate increases will be payable to members of the women's forces.

DANISH AIRFIELD: A British European Airways' Viking with other aircraft on the tarmac at Kastrup. A passenger service flies daily from London, and about 500 passengers each month travel in both directions during the summer. A Dakota night freighter service, which started on July 1st, flies on five days a week from London to Amsterdam, Copenhagen and Hamburg, returning to London direct. For the last two weeks the service has been extended to Berlin to assist in the air lift.

CIVIL AVIATION NEWS

Australia Negotiates for Freighter : International Airport for Northern Ireland : Dutch Inter-Island Services

DC–4M ACCIDENT

ONE of the North Stars operating with Trans-Canada Air Lines crashed at Sydney, Nova Scotia, on August 11th, without injury to either passengers or crew. After making a normal approach for a night landing for an intermediate call at Sydney when *en route* from Montreal to Prestwick, the starboard landing gear struck a mound of earth 20ft short of the end of the runway. It had been left by workmen, and is said to have been unlighted. The impact split the integral fuel tank and as the aircraft touched down the starboard wing caught alight. The aircraft was burnt out and became a total loss. Sydney was not a scheduled airport of call for this particular service since only two T.C.A. services stop here each week in each direction. Eastbound the stop is made on Thursdays and Saturdays.

AUSTRALIA TO MAKE FREIGHTERS

A PROPOSAL to build Bristol 170 Freighters in Australia for the R.A.A.F. is now under consideration by the Commonwealth Government, and although the plans have been kept very secret it is understood that the final decision will be made by the Cabinet this month. The proposal as it stands at present is for the construction of 10 aircraft by the Beaufort Division of the Department of Aircraft Construction at Fishermen's Bend, Victoria. Qantas, the R.N.Z.A.F. and N.Z. National Airways Corporation are all reported to be interested in the proposition, although they have not given any orders. It is expected that the first Freighter will come off the line within 20 months if the decision to go ahead is made.

DOG IN THE MANGER

IT is understood that the government of Eire has refused permission for Ulster Aviation, Ltd., to operate a scheduled air service between Belfast and Dublin. The Eire Department of Industry and Commerce is sheltering under the agreement between the United Kingdom government and the government of Ireland made in 1946 that the right to operate certain scheduled services should be reserved to Aer Lingus, which was reconstituted with British interests. The route between Dublin and Belfast was one of these so reserved, but at present Aer Lingus are operating no services. The Minister has considered it desirable, however, that the position of the government-sponsored company should not be jeopardized by granting permission to any other company for operating scheduled services on that route. Certain routes in England and Scotland have been granted to independent operators by the British Ministry of Civil Aviation on the recommendation of B.E.A. The British Corporation, however, has no jurisdiction over the Irish route and can do nothing to influence the Irish government's decision.

B.O.A.C. TRAFFIC FOR SIX MONTHS

DURING the first half of 1948 B.O.A.C. carried 57,735 passengers, as against 48,498 passengers during the corresponding period in 1947—an increase of nearly 10,000. The volume of freight handled was also nearly doubled, individual figures showing that during the first six months in 1948 a total of 935,561 kilos were handled as against 497,499 kilos the previous year. These substantial increases in freight traffic follow the introduction, in co-operation with Qantas Empire Airways and South African Airways, of special cargo services on B.O.A.C.'s routes to Australia, the East and South Africa. In addition a freight service also operates to Canada from London Airport via Prestwick.

HUNTING SURVEY EXPANSION

A NEW company, Aerial Surveys (Western Australia) Pty. Ltd., is the latest addition to the Hunting Aviation Group. Aerial Surveys has taken over the former business of Kingsley L. Watson, who is now its managing director, and using Avro Ansons the company will continue the aerial survey work on which he was engaged. A recent achievement has been the discovery of lead seams in Western Australia, and negotiations are proceeding for air survey work covering a total of over 10,000 sq miles. Interesting innovation is the introduction of a mobile photographic unit stationed at airfields from which Aerial Surveys operate, which has enabled developing and printing to be completed in the field without

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delay, thus permitting a quick, on-the-spot check of photographic cover and flying. The address of the company is 66, St. George's Terrace, Perth, W. Australia.

There are now fifteen companies in the Air Survey Section of the Group and contracts undertaken in the last year covered many thousands of square miles in countries all over the world. On August 15th the second post-war conference of the Air Survey Group opened in Toronto and representatives from the companies in the United Kingdom, Canada, South Africa, East Africa, Rhodesia, Australia, New Zealand and South America were present to discuss plans and methods for the next twelve months.

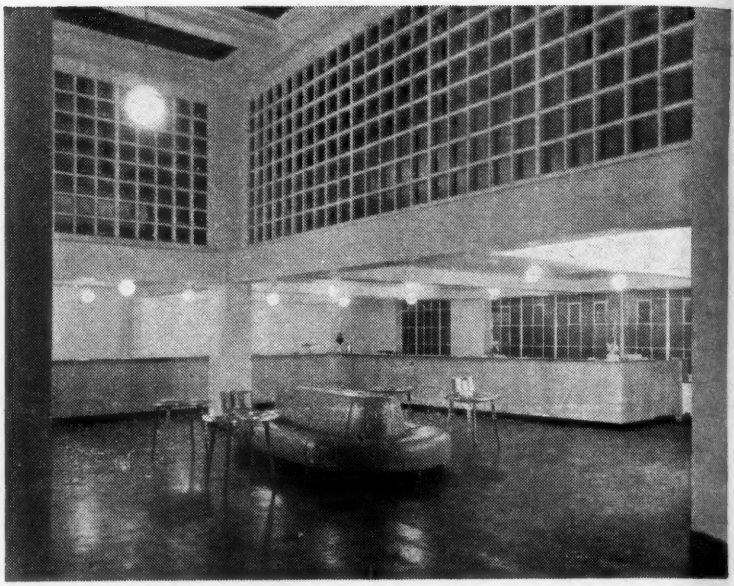
AUSTRALIAN ECONOMY

AS mentioned in *Flight*, August 12th, Australian airlines were requested to economize with aviation fuel and a saving of about 5 per cent of normal consumption was suggested. Australian National Airlines, in fact, saved 416,000 gallons, and the company is hoping to make further economies and reach a total saving of 600,000 gallons. T.A.A. have saved 285,412 gallons. Economy will probably be difficult in the future since T.A.A. have ordered six Drovers, and there are five Convair 240s due for delivery. The airline has opened up new routes in competition with private airlines, and has plans for future expansion. Qantas Empire Airways have also ordered Drovers, and are expecting five more Dakotas for internal routes. It has been suggested in Australia that petrol rationing was designed to stifle the private airlines.

Australian National Airlines received £214,000 from British Commonwealth Pacific Airlines for operating the trans-Pacific service on a guarantee of £10,540 for each trip from Sydney and £12,000 for each trip from Auckland. Mr. Ivan Holyman, managing director of A.N.A., has said that he is quite willing to run a scheduled service without any guarantee or subsidy.

NUTTS CORNER AIR TERMINAL

AFTER discussion with the Northern Ireland Advisory Council during his recent visit to Northern Ireland, details of which appeared in *Flight*, August 12th, Lord Pakenham, Minister of Civil Aviation, confirmed the decision to use Nutts Corner airfield as the air terminal for Belfast. In a subsequent statement giving reasons which prompted the decision, the Minister said that Nutts Corner had been chosen, after a survey of numerous R.A.F. airfields in Northern Ireland, for its superiority in runway length, buildings, meteorological record, and in its possibilities for further extension. The rival claims of Sydenham airport as a terminal, situated as it was within the town of Belfast and built to serve the town, had also been seriously considered against Nutts Corner, which was situated nine miles from the town. Several operational reasons, however, had led to the conclusion that the move to Nutts Corner from Sydenham was an urgent necessity for post-war scheduled services. Chief among those was the inadequacy of runway lengths at Sydenham for aircraft types being used, or rapidly being brought into use; the inadequacy of the runway layout for various wind directions, especially for smaller aircraft; and the obstructions to the approaches caused by distant high ground to the East and West, and, in the case of the nearer approaches, by dockyard gantries and shipping to the north-west, and by several obstacles including a high tension power line and pylon to the south-west. Additional drawback to Sydenham was that during the winter, visibility was less than 2,000 yards on 18 per cent of occasions, as compared with 5 per cent at Nutts Corner. Further, as a result of the short runways and poor approaches the use of instrument approach aids would constitute a danger. For the same reasons night flying at Sydenham would be dangerous. The Minister pointed out that the M.C.A. intended that Belfast should become a terminal for direct services to the Continent, and as the chosen airport had to be developed to international standards it was inadvisable to continue services into Sydenham.



DORLAND HALL: Part of the British European Airways new booking hall in Regent Street. Heal's Contracts Limited have been responsible for supplying the furniture and equipment, and Mr. A. F. Watson, A.R.I.B.A., was the architect. Each clerk has a pedestal with three drawers, and the indicator boards are of clear Perspex with interchangeable name plaques.

K.L.M. ACTIVITIES IN E. INDIES

RESULTS of the first year's operations of the K.L.M. Insular Division which, since August, 1947, has been responsible for operating scheduled air services in the Netherlands East Indies, confirm that rapid progress has been made

ACE LINE-UP: The first batch of Chrislea Super Aces has now been completed at the Exeter factory, and as soon as the material supply position improves it is hoped to put the next batch in hand. Overseas interest in the machine, particularly from Commonwealth and South American countries, has been encouraging.

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by the company in re-establishing air communications in the area. Passenger figures increased by approximately 50 per cent from an average of 9,500 a month in 1947 to an average of 14,000 a month during 1948, and the 14,000-mile route network now covers 31 of the principal centres of the islands extending to Singapore, Penang, Manila and Hollandia (New Guinea). Considerable progress has also been made in improving airport facilities in the East Indies, and Kemajoran airport (Batavia), main base of the Inter-Insular Division and terminal point of the 9,000-mile Amsterdam-Batavia route, has been provided with modern equipment and enlarged to handle four-engined aircraft. Apart from Kemajoran there are only two airports in the Netherlands East Indies large enough for multi-engined aircraft, one on the island of Biak (New Guinea), and one on the island of Moretai, but plans are in hand for the development of ten other airports in this area, which should be ready for use by 1950. The East Indies operational fleet now consists of 47 aircraft, the majority of which are Dakotas; and the total staff of the Inter-Insular Division numbers 3,000.

PLESSEY TO PRODUCE BENDIX

FOLLOWING the successful completion of patent arrangements with the Bendix Corporation of America for the manufacture and sale of its products, the Plessey Company, Limited, Ilford, are to produce, under licence, a wide range of Bendix radio equipment including mobile, ground and aircraft communication systems and navigational aids. Static ground equipment to be produced at Ilford includes M.F., H.F. and V.H.F. transmitters, V.H.F. fixed frequency receivers and lightweight V.H.F. Cathode Ray D/F. sets, while the mobile ground equipment will include mobile V.H.F. communication units for all forms of road transport and taxis as well as for railways. Fixed stations for use with this mobile equipment will also be produced. Automatic radio compasses, H.F. and M.F. transmitters and communication receivers, H.F. transmitter receivers, marker beacon receivers and intercommunication amplifiers represent the range of airborne equipment to be produced in the first instance, while multi-channel V.H.F. receivers with full navigational facilities and a multi-channel V.H.F. transmitter will be available later. A wide range of relevant aerials, control units, power boxes, handsets, microphones, keys, loudspeakers and cabling for use with the above equipment is included in the production programme; also a portable radio of the "walkie-talkie" type and a 10 channel H.F. marine radio-telephone. This entire range of equipment will be completely interchangeable with the Bendix installations already in use in Britain.

B.E.A. STATISTICS FOR JUNE

THE comparative figures issued by B.E.A. for June, 1948, and June, 1947, show that the number of passengers carried increased from 54,000 to 62,000 this year. Over half this increase was on the Continental services on which mail figures also show a substantial rise. Internal mail was more than doubled, and Continental freight increased by 83 per cent. The number of passenger stage flights completed fell from 9,913 to 6,683 this June and the miles flown also decreased (16,069 to 14,782). Passenger-miles, however, increased from 11,859,105 to 15,726,942.

BREVITIES

PAN AMERICAN AIRWAYS have announced a deduction of 25 per cent from present transatlantic round-trip fares as from October 1st. Return fare will equal single fare plus a third.

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Mr. J. H. Tudhope, general manager of operations, Trans-Canada Air Lines, has been appointed Canadian representative on the Commonwealth Communications Board.

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Air-India International intend shortly to fly three flights a fortnight instead of one a week between Bombay and London. Mail is being carried on the company's Constellations in both directions. As a result of the present political situation between Hyderabad State and the Indian Union, Air-India overfly Hyderabad on the Bombay-Madras-Colombo service. No direct air communication is being made between the Indian Union and Hyderabad (Deccan).

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Trans-Australia Airlines announce that the company's five Convair 240s are to be named after famous Australian explorers, *John Forrest, Thomas Mitchell, James Cook, George Bass* and *Matthew Flinders*. The first is due to pass through London Airport on August 23rd where a number of immigrant passengers will embark for Australia.

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Air France aims at the eventual establishment of a direct air service linking Canada with the French capital. An experimental flight, carrying passengers, was completed last month leaving Paris 21 minutes after midday and arriving at Montreal at 02.28 hrs. the following morning, with an intermediate stop at Shannon airport. Actual flying time was 14 hours 7 minutes.

* * *

Bank Holiday week-end broke all previous records for Aer Lingus. On the Saturday alone the company carried 1,340 passengers—double the total carried on Bank Holiday Saturday in 1947. Sunday's figure this year was 1,082, and Monday's was 914, the total of 3,336 being the highest number of passengers carried by Aer Lingus over any week-end in its history. Over the whole week 6,180 passengers were carried, as against 4,106 in the equivalent week last year—an increase of more than 50 per cent. The month of July also broke all previous records for the company, when 24,672 passengers travelled, compared with 13,618 in July, 1947—an increase of more than 80 per cent.

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The S.A.S. North Norway route, operated with Short Sandringham flying-boats from Stavanger to Tromso, has from April 19th to date carried 15,000 passengers, the majority being foreign tourists. Last year, when the route was flown from June 2nd to September 16th, the total number of passengers was 13,700.

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From August 16th British South American Airways' services between Nassau and Miami will be increased from three to eight times weekly in each direction. The Corporation hope eventually to put a Tudor IV on the route. On August 21st a new service will fly three times a week in each direction between Nassau and Havana.

* * *

H.M. Stationery Office has now taken over the sale in the United Kingdom of publications issued by I.C.A.O. which, as announced in *Flight*, May 6th, were previously only obtainable from Paris. Publications immediately available are listed in Notice to Airmen No. 277, and further lists will be issued as and when additional publications are placed on sale. Purchases may be made directly from H.M. Stationery Office, York House, Kingsway, London, W.C.2, or ordered by post from the same office, P.O. Box 569, London, S.E.1.

* * *

American Overseas Airlines broke all previous records for operations in Germany during July when it carried 2,572 passengers, 387,000lb of cargo and 24,500lb of German air mail on the recently started mail run between Frankfurt and Berlin. The company is the only scheduled American commercial air carrier connecting the U.S. Zone with blockaded Berlin, and operates 22 flights each week using DC-3s and DC-4s. In addition, the company operates a twice-daily round-trip freighter service between the two cities.

* * *

Resurfacing of runways at Renfrew airport is due to commence to-day. The work to be completed consists of 900ft at the end of runways 03-21 and 08-26 and the connecting taxiways, plus certain areas at their intersection, and will be in progress until further notice. Standard unserviceability markings, i.e., white crosses, will mark those portions on which

"Oh yes, I have been promised delivery of my first maple broomstick some time in March."

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work is being carried out, the commencement of effective runway length will be indicated by threshold markings, and contractors' equipment, vehicles, etc., which may be up to 10ft in height, will be marked by two yellow discs intersecting at right angles. Full details of the restrictions in force, together with a diagram showing the areas under construction, are given in Notice to Airmen No. 281. The programme of work and its effect on facilities at Renfrew airport are also given.

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A report from Toronto states that B.O.A.C. are awaiting British Cabinet approval to charter six Trans-Canada Air Lines' North Stars for training purposes.

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Lancastrians operated by Qantas Empire Airways on the Australia-Japan service have flown over 500,000 miles since the service was begun in December, 1947. During the period December-May 861 passengers and 152,438 lb of troop mail were carried.

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Aircraft captains have been advised by the Ministry of Civil Aviation that radio telephony communications between aircraft crews and ground staffs at Northolt and London airports are being "taken down" on automatic speech recording apparatus. The equipment is by the Dictaphone Company.

B.E.A. started a new service on August 14th between Jersey and Dinard. Two flights a day will be made, one in the morning and one in the afternoon. The return fare is £4 10s. Twenty-four-hour excursion tickets are being issued for this route, on which Rapides are being used, at a cost of £3 10s.

* * *

During the first week of participation in the Berlin air lift, civil aircraft chartered from nine different firms by B.E.A. averaged eight hours flying a day for six days. The fleet chartered by B.E.A. consists of 10 Dakotas, a Halifax, a Liberator and a Hythe. The sum total of their loads would be approximately 50 tons per flight.

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A. Cdre. W. P. G. Pretty, O.B.E., has been appointed, with effect from August 1st, to the new post of Director General of Navigational Services. He will be in charge of Control, Navigation and Telecommunications under the Controller of Ground Services. During the war A. Cdre. Pretty, who is 39, was engaged in signals and radio duties both in the Air Ministry and with Fighter Command. Subsequently he became Chief Signals Officer at A.C.S.E.A., and was later appointed C.S.O. at Headquarters Air Command, Far East, where he served until he was seconded to the M.C.A. in 1947. He is succeeded in his appointment as Director of Telecommunications by A. Cdre. W. E. G. Mann, C.B.E., D.F.C., A.M.I.E.E., who has held several appointments in the Ministry of Civil Aviation.

FROM THE CLUBS

SOUTHEND Municipal Flying School completed 360 hours flying during the month of July. Nine cross-country flights to the Continent were made and included trips to Le Touquet, Ostend and Brussels.

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THE East Riding Flying Club are holding their annual air display in conjunction with Butlin's (Filey) aerial weekend which covers September 4th and 5th. The display is scheduled to commence at 2 p.m. on the latter date.

* * *

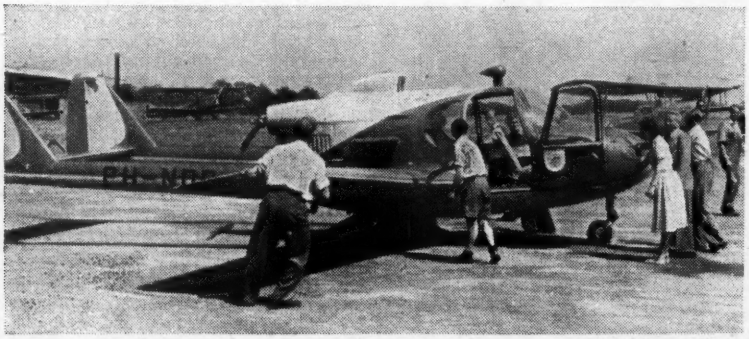
AN air display is to be held at Cowes airport on Sunday, August 22nd, commencing at 2.15 p.m. The programme includes flying and height judging competitions, demonstrations of aircraft, aerobatics and gliding, and an exhibition of experimental model sea and air craft has also been arranged. Special bus services will run from Newport, and the price of admission is 1s 6d.

* * *

DESPITE alarming weather reports, the Midland Aero Club had as perfect a day as they could have wished for their "At Home" on August 7th. Although the display was not open to the public over 2,000 members and friends turned up. Mr. Sawyer, of Nottingham Flying Club, won the sealed time of arrival competition, whilst Mr. Ron Paine, of Wolverhampton, won the lucky spot landing. Tiger Moths from No. 5 Reserve School, Castle Bromwich, opened the programme with formation flying followed by a demonstration of the Chrislea Ace and the Miles Aerovan. The highlight of the afternoon was the annual handicap air race for which there were 15 entrants, and which proved to be a most exciting affair. Mr. Rowarth and Capt. Dancy, Royal Aero Club handicappers, did a most excellent job, so that the finish was extremely close, including practically the whole field. The winner was Mr. H. Everitt, of Knowle, with Mr. Redgrave and Mr. R. L. Jackson very close second and third. The Midland Aero Club won the team award and the chairman was very pleased to receive the trophy back from Wolverhampton Flying Club who won it last year. An excellent show was put on by Spitfires of 610 Auxiliary Squadron from Chester and a spectacular exhibition of aerobatics carried out by S/L. Aston, D.F.C. Other competitions included a spot landing which was won by Mr. Morton, of Coventry Aero Club, who therefore won the *Evening Despatch* trophy, whilst the bombing competition was won by Mr. Penzer, of the Midland Aero Club. Mr. Sutcliffe, the pre-war chief instructor and secretary, gave a very good demonstration of crazy flying in a Tiger Moth. The programme was concluded by the President of the Club presenting the prizes and trophies. Mr. E. R. Pack, of the Anglo-American Oil Company, kept up a continuous commentary on the afternoon's events, and afterwards made a short broadcast in the sports edition of the Midland Regional News.

* * *

HEAVY rain and bad visibility curtailed the programme arranged by the Darlington and District Aero Club for their rally and air display at Croft airfield on Saturday, July 31st. The event, which was one of the most ambitious ever attempted by the club, attracted a crowd of nearly 5,000 spectators, and two hours before the start roads leading to the airfield were thronged with cars and cyclists. Several visiting pilots arrived in their own aircraft from Newcastle, Nottingham, Brough, Cambridge, York and Sherburn Clubs. The programme commenced with a fireworks display and a fanfare of trumpets by the R.A.F. Regiment band from Catterick. This was followed by a demonstration of "homing" procedure by pilots from the R.A.F. Station. Several competitions were held, the arrival competition being won by Mr. W. T. Shipside, of Nottingham, with Mr. E. L. Tyson, of York, second, and the height-judging competition by Patricia Curry. First prize for the best-kept aircraft went to Mr. J. E. Nicholson, Darlington, and second prize to Mr. H. Whittaker, and first and second awards for the oldest licence went to Mr. A. G. Wilson, of Sherburn, and Mr. W. T. Shipside, respectively. In the speed-judging contests, the award for the slowest speed was won by Mr. A. C. Williamson, and for the fastest speed by Messrs. S. Webb and J. R. Naisbett. Lady Dugdale presented the prizes, and Ald. J. D. Hinks, of Darlington, moved a vote of thanks.



"*Flight*" photograph.

DUTCH VISITOR: During its recent visit to this country the Fokker Promoter spent a few hours at Fair Oaks airfield. Mr. H. Van Beem of the Fokker company, and Mr. H. B. Bulten, chief pilot of Fritz Diepen, the distributors, displayed the machine's features to club and V.R. pilots.

PERCIVAL PRINCE

Design and Operational Features of an 8/10-seater Feeder-line Transport with Leonides Engines

WHILST similar in general appearance to its forerunner, the Merganser, the Percival Prince reveals considerable improvements and advances in design detail. In fact, the Percival company has again produced a feeder-line aircraft with comfort and safety for the passenger and cheap and simple operation for the owner as the main considerations. By this it must not be assumed that high performance has been sacrificed. Outside the United Kingdom, especially where feeder-line aircraft fill an important role in conveying passengers between remote areas and the main trunk routes, it is important for passenger comfort that there shall be as little noticeable restriction of space as possible in the feeder-line aircraft in comparison with the trunk-line aircraft, and also an equal capacity in each for carrying baggage.

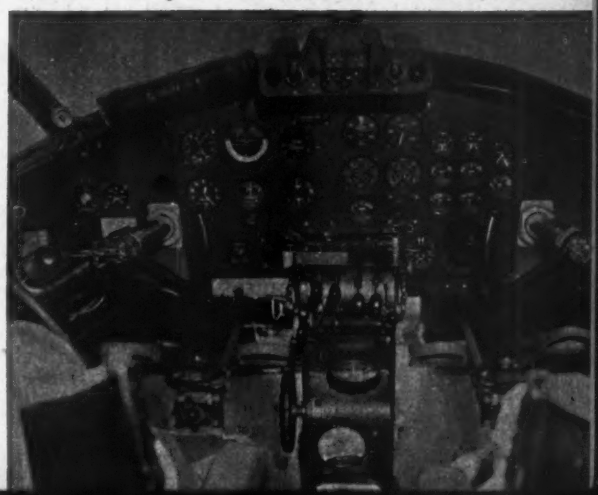
There is an impression when inside the Prince of a shortened version of a large airliner. The fuselage is deep, the windows are large, and in the company's fully equipped eight-seater version each passenger is allowed ample room, with the convenience of a toilet. From the operator's point of view it may be desirable to increase capacity, and provision has been made for a double seat to be fitted in place of the toilet on the starboard side at the rear. It would even be possible, perhaps (for very short-haul operators), to squeeze-in yet another seat on each side, but by doing so the designer's object of building the aircraft around the passenger would be lost.

High-wing design is, of course, particularly popular with passengers, and the large windows in the Prince allow an excellent all-round view from every seated position. At the same time the design results in a low-slung fuselage with a consequent low floor level—an obvious advantage for freight loading. With direct interests in survey work, the constructors have also paid attention to the alternative use of the Prince as a survey aircraft, and a special version with a nose extended 2ft for carrying an operator in the prone position is already in the mock-up stage.

Operators' maintenance and servicing requirements have not been neglected. Thirty-two inspection panels throughout the fuselage, wings and tail unit permit easy access, and in particular, the pneumatic runs can be easily reached throughout their length. The company are also attempting a high interchangeability factor, and a loose-leaf handbook has been produced employing photographs for the identification of spare parts, the object being simplification when ordering replacements—an important factor, especially in view of the comparative inexperience of engineers with the new Alvis Leonides power plants. Although the semi-monocoque construction of the fuselage is orthodox, production problems have been studied, and the entire aircraft has been broken down into a number of small assemblies.

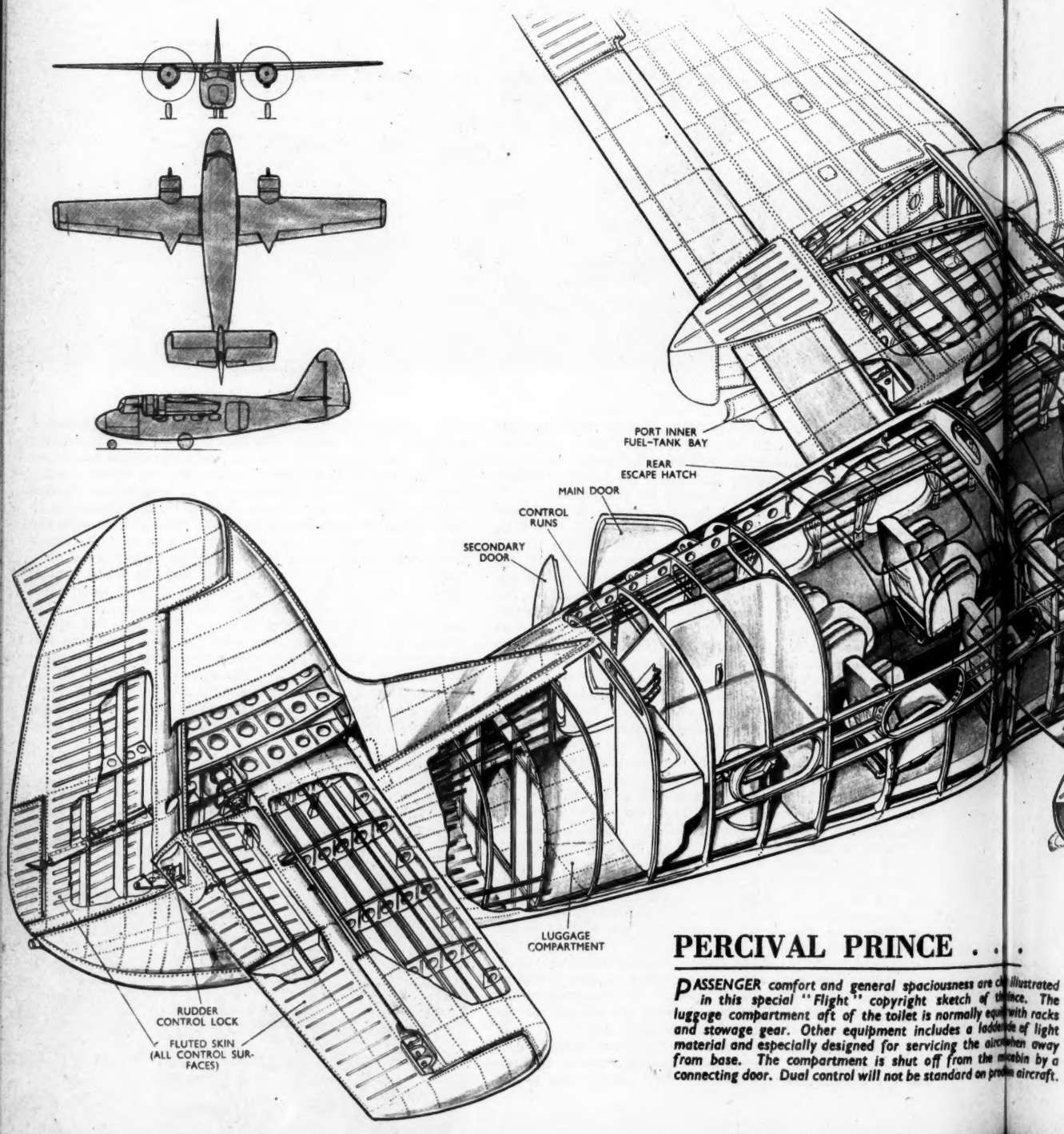
On the production line, the skeleton construction of frames and longerons will form the first complete stage. The top-hat section stringers, with the light-alloy skin will be assembled in prefabricated sections about three stringers deep and up to 14ft long. Throughout the length of the fuselage some frames are attached completely by flush rivets to the skin, whereas others are riveted to the free flanges of the stringers. The main frame carries a massive forged

The control locking bar on the throttle box is in the locked position.



PERCIVAL PRINCE DATA
(Two Alvis 550 h.p. Leonides)

Overall length	42ft 11in	Power loading	9.7 lb/h.p.
Overall height	16ft 1in	Payload	1,760 lb or 8 passengers with 400 lb baggage
Wing span	56ft 0in	Initial climb	1,000 ft per minute
Wing area	365 sq. ft	Service ceiling	24,000ft
All-up weight	10,650 lb	Range	800 miles with full payload and 121 Imperial gallons at 140 m.p.h. cruising at 10,000ft
Empty weight	7,600 lb		
Wing loading	29.2 lb/sq ft	Cruising speed at 69 per cent power	179 m.p.h. at 7,750ft

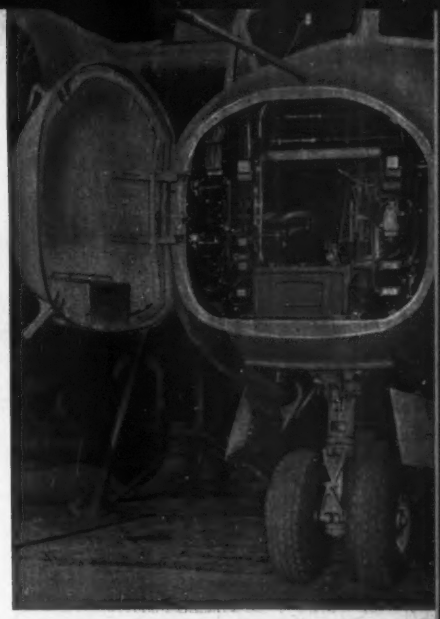


PERCIVAL PRINCE . . .

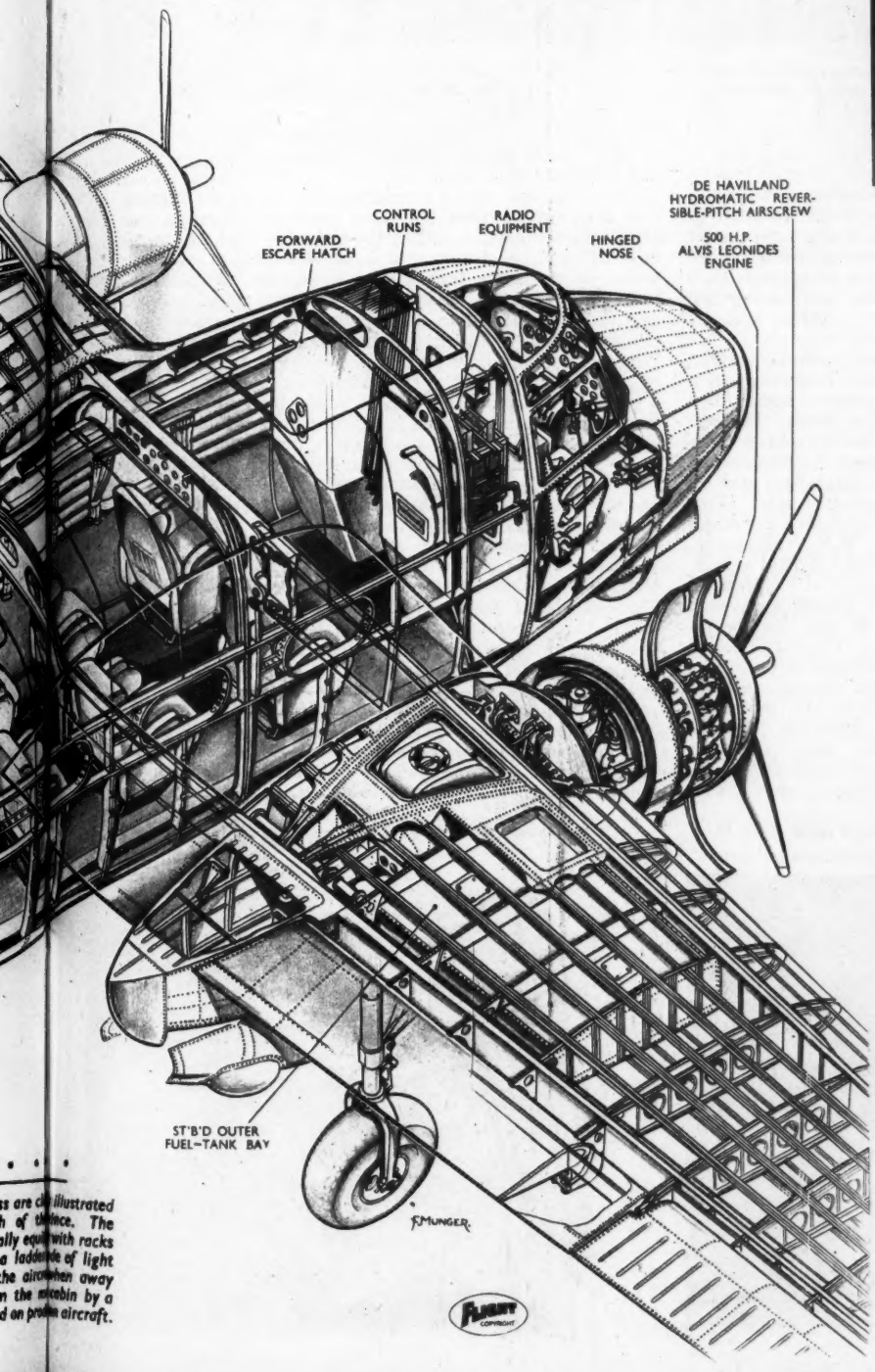
PASSENGER comfort and general spaciousness are clearly illustrated in this special "Flight" copyright sketch of the cabin. The luggage compartment aft of the toilet is normally equipped with racks and stowage gear. Other equipment includes a ladder-like of light material and especially designed for servicing the aircraft when away from base. The compartment is shut off from the main cabin by a connecting door. Dual control will not be standard on production aircraft.

bridge member for the main wing spar attachment, and there is a doubled pressed diaphragm bridge for the secondary spar. Two robust frames in the tail cone carry the tail unit. On the underside of the fuselage, on production aircraft, lugs will be provided for easy float attachment, while to comply with I.C.A.O. requirements two escape hatches have been designed in the starboard side of the roof, thus allowing the port side of the roof to be used for control cables and pneumatic runs.

The nose of this aircraft has been made to hinge open from a point just forward of the windscreen to give easy access to the back of the instrument panel, the controls and pneumatic runs, and the two 12-volt 30 amp/hr Exide batteries. Inserted just below the point of the hinged nose is a Harley taxi lamp giving 360 deg. of light around the aircraft. The fully castering double



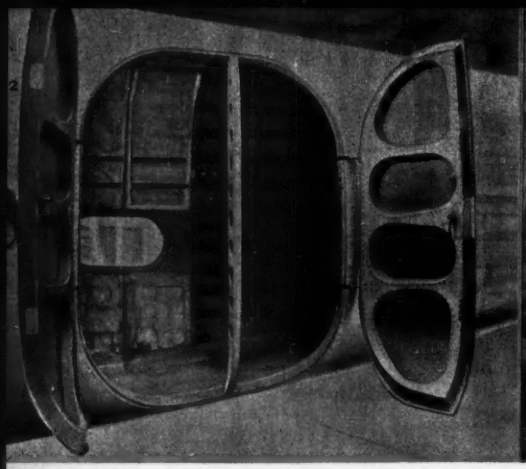
Inspection behind the instrument panel is simplified by a door in the nose. A starter plug is on the port side. The prototype has a sideslip indicator in front of the nose.



nose-wheel retracts backwards and is enclosed behind double doors hinged on each side. Pick-up points are so designed on both top and bottom booms that the stresses are spread across formers of the entire nose section. The cockpit has glass windows with an amber-tinted Perspex roof, and a windscreen which has successfully withstood the 4-lb bird test at Farnborough. Clear-vision panels are standard, and windscreen wipers will be fitted to production aircraft. The view is enhanced by the deep and only slightly inclined vee-windscreens, about 16in from the pilot's face, and the short nose which falls away sharply.

Normal crew for operating the Percival Prince would be pilot and navigator/radio-operator. It will not, therefore, be standard to equip the starboard seat with dual controls, although a set could be included without difficulty, as in the prototype now flying. Half-spectacle type of controls are employed, with a push-pull action. The rudder bars are on the same principle as those of the Prentice, which are capable of considerable adjustment whilst retaining parallel action and unchanged leverage. Braking, which is of the Palmer pneumatic type, operates differentially on the pedals when applied by a thumb-operated lever on the control column.

The central pedestal is compact and includes three large trimmers, easy to hand and with clear dials for movement indication. The throttle box incorporates, in addition to the two throttle levers, flap and mixture control, and an extension is provided downwards and backwards in the quadrant for movement of the throttle levers through and past the idling position for reversing pitch. A locking bar hinges over the throttle box to prevent the throttles being opened when the controls are locked. This



A section of the frame across the wide door is removable for freight loading. Only the forward portion would be used for passengers.

Floor construction looking aft, total area for freight-carrying is 94.3 sq. ft. The fuselage is inverted during assembly.

PERCIVAL PRINCE . . . .

centrally controlled device locks the elevators, ailerons and rudder, at positions in the transmission systems immediately before the particular surface, by means of a tapered pin on the frame operated to engage with the mechanism when the surfaces are in the central position; thus all controls may be locked when on the ground without prejudicing the safety of the aircraft through forgetfulness during take-off. Another advantage is that rigging is simplified.

The instrument panel is clear and contains nothing superfluous, but at the same time includes everything which is essential, and it is understood that either a Sperry or a Smith S.E.P.1 automatic pilot could be fitted. The rest of the cockpit is clear, since the universally racked radio equipment is installed aft of the front bulkhead on the starboard side. Provision is made for Marconi H.F., M.F., automatic, D.F. and S.T.R.12 V.H.F. equipment. Marconi Blind - Approach System A.D. 86 may also be installed. The entire pilot's compartment is built as a separate sub-assembly for attachment to the main cabin structure. Access to the main cabin is through a connecting door.

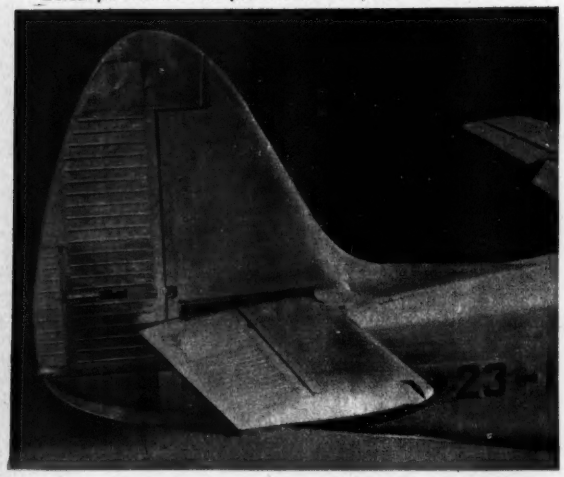
Wash basin and cupboards in coloured Perspex weigh only .6 lb.

As already mentioned, a machined forging forms part of the main fuselage frame to which the wings are attached. There is no centre section and the mainplane is of all-metal construction consisting of one main spar and a subsidiary spar on which ailerons and flaps are mounted. Ailerons are mass balanced, and all control surfaces, including the trimming tabs, are metal covered but have fluted skins to provide integral stiffening whilst at the same time saving weight on internal construction. Flaps of the N.A.C.A. type are metal covered and may be selected to three positions: up, take-off and landing. Each wing tip has been made detachable, and removable fillings have been provided for alternative fitting of de-icing equipment. The camber at the wing tips is 4 per cent as against 2 per cent at the roots. The upper surface of the mainplane is straight spanwise, but tapering of wing thickness gives an effective dihedral of $1\frac{3}{4}$ deg.

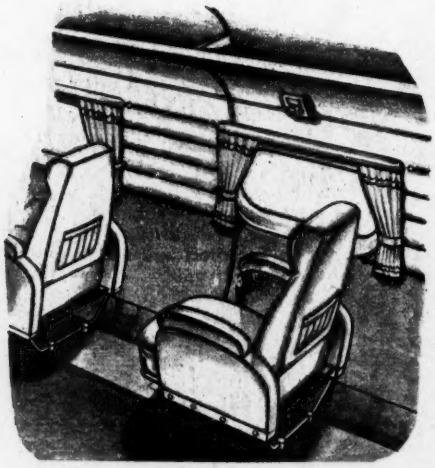
As on the mainplane, the entire tail unit is equipped to take T.K.S. de-icing equipment, and again control surfaces are all-metal with fluted skins. Percivals have found such construction for control surfaces to be lighter than fabric, cheaper to construct, and giving a more efficient control surface. The large fin has been slightly modified with a shallow dorsal extension which, in the words of Mr. Bage, Percival's chief designer, provides the answer to the fin stall. The aft end of the fuselage on the underside has been extended to the extremity and forms a fixed extension of the lower end of the rudder. On the under surface of the tail unit is an extrusion which forms a bumper against the tail touching the ground.

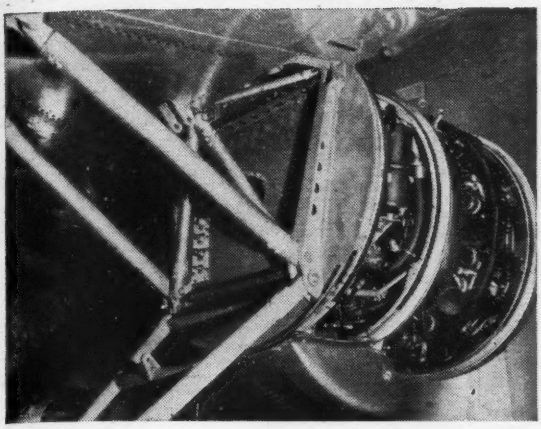
Power-unit installation is clean, and inspection panels give easy access to the nine-cylinder air-cooler radial supercharged direct-injection engines. De Havilland hydromatic constant-speed, feathering three-blade airscrews are fitted

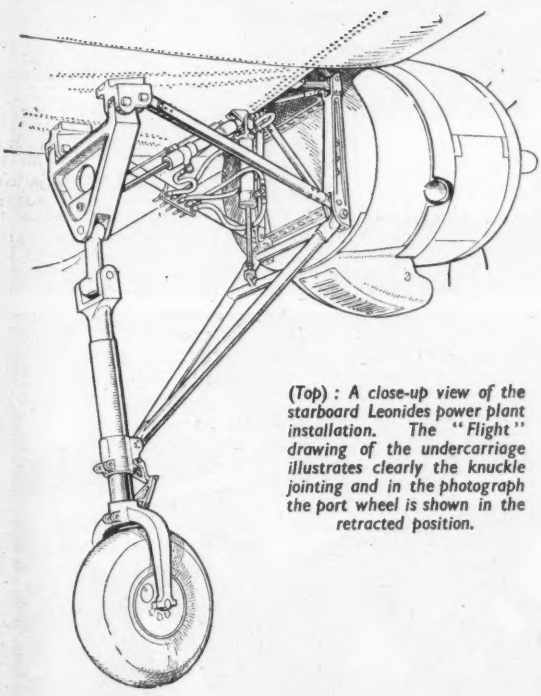
Dorsal fin extension and fluted control surfaces on the tail unit.



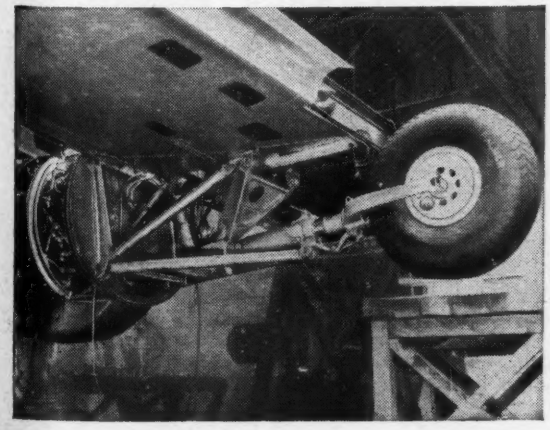
Each passenger has a good view and ample leg room.







(Top) : A close-up view of the starboard Leonides power plant installation. The "Flight" drawing of the undercarriage illustrates clearly the knuckle jointing and in the photograph the port wheel is shown in the retracted position.



Percival Prince . . . . .

and, when approved by the A.R.B., reversible control will also be included. Two flexible fuel tanks in each wing, one on each side of the Leonides 501/4 engine, are supported by internal skin, and each side feeds its adjacent engine, but a cross-feed arrangement to the opposite engine is also provided. Outboard tanks hold 35 gals. each, inboard tanks 55 gals.

Main undercarriage assembly comprises knuckle-jointed main legs with oleo shock absorbers. Pick-up points on the mainplane are at the apex of a triangular beam bracing connecting the main and subsidiary spars. Operation of the undercarriage, flaps, wheel brakes, carburettor air regulator and slow-running cut-out is pneumatic, and the compressed-air supply system is duplicated by the use of a compressor on each engine feeding its own storage bottle, so permitting all services to operate normally in the event of one engine or compressor not functioning.

The main cabin has a floor stressed for a freight loading up to 1,090 lb/sq ft. Hot air for the cabin is conducted from Janitrol heaters through the floor in the centre of the fuselage, which is fitted with detachable panels, stressed equally for heavy freight. Main entry is made through a door which is particularly wide and opens outwards in two sections from one of the frames, a section of which is removable. The forward half would be used for passengers, but when the frame section is removed, ample width is available for loading bulky freight. The opening is strengthened top and bottom with semi-longerons.

In the eight-seater version toilet arrangements include an Elsan, a wash basin, and cupboards made of coloured Perspex which weigh only 6lb. The entire compartment can be removed in a very short time to provide extra seating. Aft of the toilet is the luggage compartment.

Plastics and Glassweave

There is said to be more plastics used in this aircraft than in any known previous design. In fact, in the interior furnishing it has been used whenever possible, and it is rather interesting that sixteenth-of-an-inch Perspex is slightly lighter than 22-gauge duralumin. Consequently, window surrounds, reading lights and all switch covers, and other trimmings, are in Perspex, making a total weight of about 50lb. Other advantages which are obtained from using plastics are that it is fire-proof and will not carry disease. For similar reasons all the seat coverings and curtains are in material of glass weave, and the panels on the inside of the aircraft are of Dufaytex, which is an asbestos board covered with fibre glass and glass weave. All the panels and sound-proofing are attached by Dzus fasteners and can be taken away when the aircraft is converted for freighting; in fact only the quilting between the windows remains in the aircraft when it is converted, an operation which can be carried out in about an hour.

The first Prince prototype has now flown 40 hours, mostly on handling trials. Single-engine tests have been carried out in the air but not on take-off since Luton has no runways. The tests are said to have been highly successful; general stability is reported to be good, and no marked swing was apparent when an engine was cut. Flying with port engine feathered represents the most unstable condition, but even that can easily be trimmed-out.

Production aircraft problems have been anticipated and eliminated where possible for standard aircraft, but it is thought the special survey version may require an increase in tail areas since pitching and yawing moments can be effected by the longer nose. Full performance figures and consequently operating costs are not yet complete, but those which are available indicate that the Prince is an aircraft capable of carrying a useful payload over distances normally expected of feeder-line aircraft. It may not be quite large enough for United Kingdom internal scheduled operations, but at something like £20,000 apiece—a figure which must be regarded as approximate since bulk orders will reduce the price considerably—the Prince will be attractive to charter operators in this country and airline operators in many parts of the world.

Hermes IV Interior

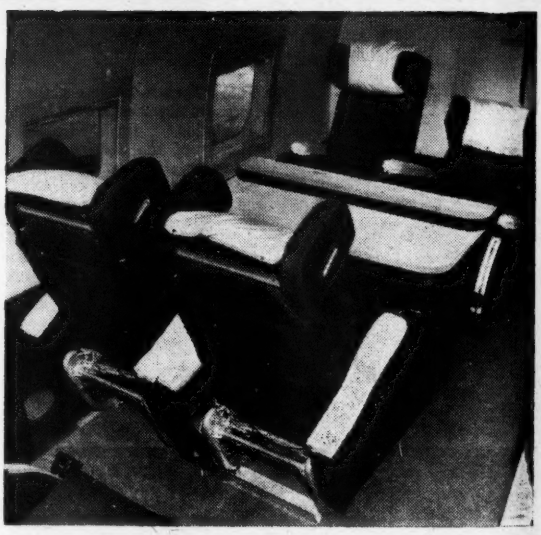
Layout of the 40-seater Handley-Page Transport for B.O.A.C.

HAVING served its useful purpose as a life-size tryout for the whims of B.O.A.C., the mock-up of the Hermes IV is to be denuded and its furnishings transferred to the prototype, now nearly completed, in readiness for the S.B.A.C. show.

One may, perhaps, be permitted to ask a solemn favour of B.O.A.C.: that the Corporation's many departmental executives will not vacillate during the next twelve months before the first Hermes IV is delivered, but stand boldly by decisions and continue in co-operation with Handley-Page so that a post-war British aircraft may soon fly on the Empire air routes.

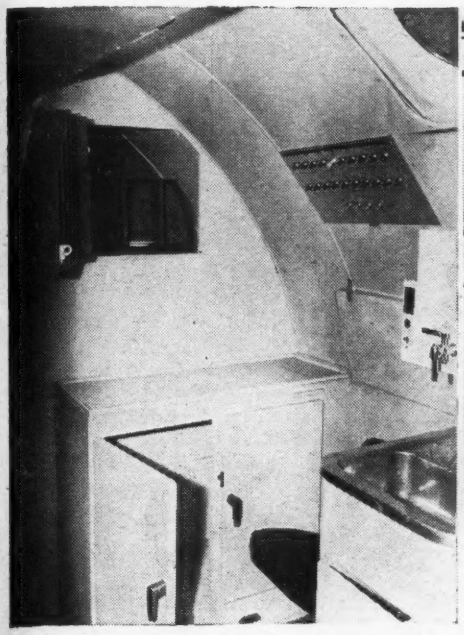
On entering the Hermes by the door at the rear on the port side, passengers' reaction will be one of immediate relief from any "tube effect." The large-diameter, circular fuselage gives ample floor space and head room, and a false bulkhead amidships divides the cabin into two lounge-like compartments. In the rear compartment there are four double seats on the port side and six on the starboard side, with only those immediately behind the partition facing backwards. Those two seats share a table each with the first pair of forward-facing seats. Aft of the seats on the port side is the purser's office, and aft of the door a hat-and-coat hanging cupboard. On the starboard side, and across the rear of the aircraft, are situated the toilets.

The front compartment has five double seats on each side

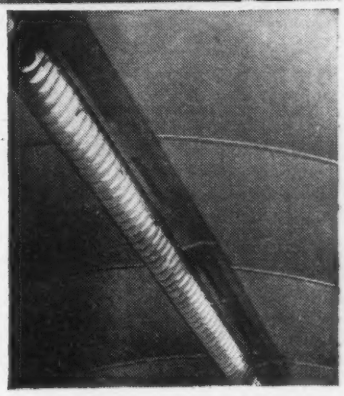


(Top): Looking towards the flight deck from the passenger entrance. The cloakroom-cum-office is on the left. (Above): Sixteen passengers share four fixed tables, with folding edges. In this photograph the far edge of the table is folded up and one of the aft-facing seats is shown in the fully-reclined position.

with, again, a pair of backward-facing seats in the foremost position sharing a table. Forward of the port side seats is a gentlemen's toilet with a folding washbasin on the wall and a mirror and electric point for a razor. Doors of the toilets are particularly convenient, with an opening in the centre. One half opens outwards and the other half, to which it is connected, opens inwards. Space taken up by the forward toilet is balanced on the starboard side by an extension rearward of the galley, access to which is



(Left) : A deep cupboard in the forward bulkhead of the galley is fitted with compartments for crockery. On the wall is the stewards' call-indicating panel.



(Above) : The pedestal between the pilots' seats with behind, on the centre panel of the dashboard, engine instruments for the pilot. The navigator's station is on the starboard side. (Right) : Glare from the fluorescent lighting is broken by metal partitions. On either side of the tubes are the stale-air outlets.

made through a stable-type door centrally situated in the recess made by the toilet and the extension. With a slightly altered arrangement there would be room for a cocktail bar. In the galley, equipped for two stewards, is a Crittall electric oven, a Drikold CO_2 refrigerator, a G.E.C. water-heater, a Birmabright sink, cupboards fitted to B.O.A.C. requirements for stowing the Corporation's crockery of standard design, and two folding seats for stewards.

Only through the galley is access possible to the flight deck, one of the few criticisms of this layout. It may not be a serious fault, but one which is likely to cause some inconvenience to the crew. The flight deck comprises the usual two pilots' seats, with the radio operator's station facing aft behind the captain, and the navigator's station behind the second pilot facing forward. The engineer faces aft at his comprehensive panel and controls behind the navigator. In view of B.O.A.C.'s plans that navigating should be part of the second pilot's duty, the two positions are not conveniently placed. An arrangement to allow the second pilot a quick change would, it is thought, have saved energy and time. Diplomatic mail is carried in a compartment behind the engineer's panel.

Contained in the radio operator's panel is the radio equipment and the Exide batteries which provide 120 volts. They are stored behind a door hinged to the floor which, when opened, provides rails on which the five large batteries may be pulled out. Freight is carried in the compartment running the length of the fuselage on the underside, but extra freight and baggage may be accommodated in the space on the port side opposite the galley. This space could also be used alternatively as the crew's rest room. Between this compartment and the radio equipment is another large door. The entire flight deck is sound-proofed and presents a clean and pleasing appearance in dark-green Duranide upholstery.

Cabin Furnishing

Colour scheme for the passenger cabin is pink beige for the roof and sides in Duranide down to a dado of some two feet high in Betula wood veneer, and a dark beige carpet. The dado is flat at the top and wide enough to embody stewards' call buttons and reading-lamp switches. The Phœnix Telephone and Electric Works Limited are responsible for the stewards' call system.

Through ports near the floor the temperature-controlled air enters for heating and pressurization. Stale air escapes through vents in the roof on each side of the central fluorescent cabin light strips. Upholstering of the specially designed B.O.A.C. chairs is in royal blue cloth. It is pointless to describe the seats since B.O.A.C. intend to modify slightly some details of the design. They will be similar, however, with ear-flap type head rests and a large range in adjustment to allow reclining positions almost to the horizontal. It is hoped the control of adjustment will be altered from the present two-handed method—the use of clumsy knobs on each armrest. These hinder movement between seats and are almost impossible for use by elderly or disabled passengers. Armrests also hold ashtrays which are novel but unnecessarily complicated, and individual tables, the design of which is not yet settled.

Windows of the Hermes IV are quite large, double-thickness, and except for the foremost two on each side, every other one incorporates an escape hatch; unfortunately this 40-seater arrangement for B.O.A.C. does not allow each passenger a conveniently situated window. Criticism must also be made of the large tables, with a double leaf folding upwards, front and rear. They cause a great deal of breakage, and bad temper amongst passengers. A luggage rack in keeping with the shape of the fuselage runs the entire length of the two cabins. On the under side of the rack reading lights for individual passengers are buried.

Although this layout is pleasing, and is designed for the comfort of the seated passenger, it may not be the ideal lay-out for medium/long flight stages on which the Hermes IV will be employed. Completely reclining seats are an advantage when long periods of night flying must be undertaken, but for the 6/8-hour stages of the Hermes IV it is more probable that the majority of passengers would prefer a seat with less adjustment, resulting in a saving of space which might permit the inclusion of a promenade deck. There is little opportunity on this aircraft with the B.O.A.C. layout for the sort of relaxation that is required.

POWER-PLANT PRODUCTION IN SWEDEN

Brief Survey of the Work of Svenska Flygmotor AB : Lysholm Gas-Turbine Designs : Goblin Manufacture Under Licence

AIRCRAFT engine production in Sweden reached important proportions during the late war, when the country was cut off from all outside sources of aircraft power units; however, this was not by any means the start. The company Svenska Flygmotor AB had its foundations in Nohab Flygmotor-fabriker AB, which was formed in the 'thirties as a branch of Nydquist and Holm AB to manufacture, under licence granted to the Swedish government, Bristol Mercury and Pegasus engines. In 1941 the principal car manufacturing company, AB Volvo, bought a controlling interest in Flygmotor and another concern, Ulvsunda Verkstäder, thereby forming the largest industrial engineering combine in Sweden, with factories at Trollhättan, Göteborg, Skovde and Stockholm. The additional share capital, doubled to eight million kroner, was provided to expand aircraft engine production in Sweden. The other major shareholder in the concern is the Bofors company (32.5 per cent).

Flygmotor at Trollhättan have come into greater prominence recently since they started to build gas turbines. At first de Havilland Goblins are to be built for Swedish Vampires and SAAB J21Rs. Frequent reference has been made to these plans in the recent series of articles on the Swedish aircraft industry and Air Force. Sweden is also anxious to build her own gas turbines as soon as possible, and in view of the recent announcement of the SAAB J29 Ghost-powered fighter, it may be assumed that arrangements may be made at a later date to build D.H. Ghosts under licence as well as Goblins.

Among leading engine designers in Sweden Mr. A. J. R. Lysholm, M.I.Mech.E., must be mentioned in particular.

A de Havilland Goblin running on one of the new test beds in the Flygmotor factory at Trollhättan.

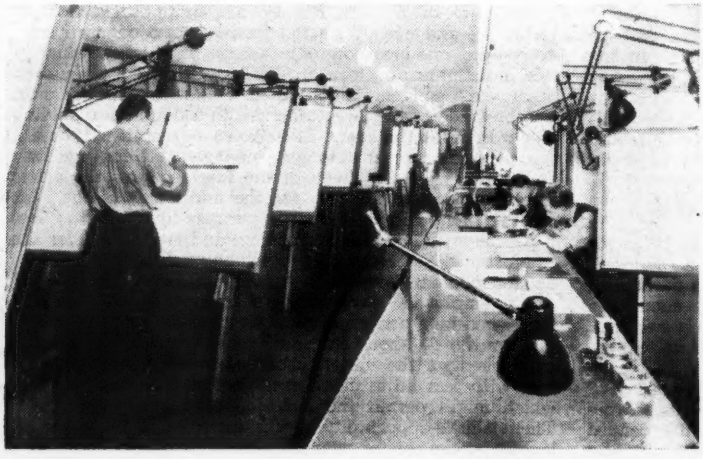
As early as April, 1936, he started to apply for British patents for gas turbines of his design, and although the first units were not built, later development in gas turbines for marine and industrial purposes, as well as for aircraft—some embodying his patent compressor system—have been put into service or run as experimental units.

Early Swedish Turbines

In much the same way as Dr. Griffiths designed and tested small axial-flow compressors in this country, several compressor stages designed by Lysholm were tested by Bofors in the 1935-37 period. A much more detailed account of his work was contained in a paper which he read before the Institution of Mechanical Engineers in March last year. Reference was also made to Lysholm's aircraft gas-turbine designs in issues of *Flight* early in the war, and two diagrammatic layouts are here reproduced. It will be seen that he tends to favour two or more stages of centrifugal compression, a reverse-flow annular combustion chamber and a multi-stage turbine. Controllable jet nozzle area is another feature of his designs. Flygmotor are now concerned with experimental units designed by Lysholm, one of which has been running for many months.

During the war the principal units under construction by the Swedish company were the Pratt and Whitney Twin Wasp and the German D.B.605B. Drawings for Wasp production were made from engines purchased from America before the war, each component being measured up and copied; a formidable task completed with success. An agreement to build, which could not be negotiated in wartime, was made in retrospect.

Production orders for the Swedish Air Force for D.B.605Bs, German-designed engines well known in wartime and roughly equivalent to the Merlin, have recently been completed. The scale of Goblin production will depend chiefly upon demand and the

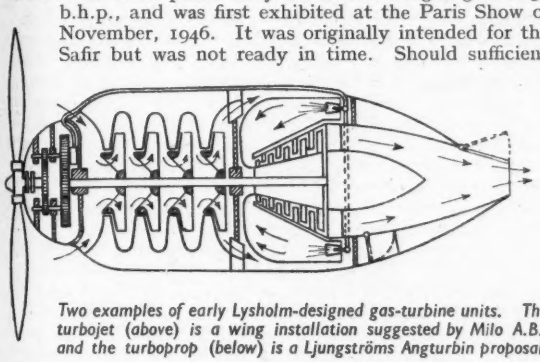


The Svenska Flygmotor AB drawing office.

Power-Plant Production in Sweden . . . .

availability of certain special machine tools. In order to keep the team together in readiness for future large-scale aircraft engine production, interim constructional work has been undertaken in the form of a 100 h.p. commercial diesel engine, and three types of printing presses.

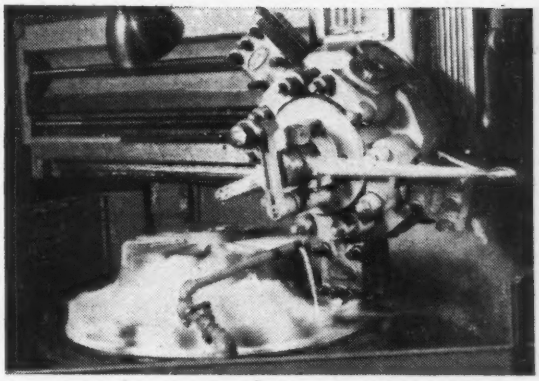
A visitor to the attractive factory alongside the SAAB works cannot help but be surprised by the equipment and potential scale of production. A pick of the world's machine tools are laid out in a most efficient manner in the large, airy shops. During an interview on the occasion of our recent visit to Trollhättan, the company's president, Mr. Gunnar Engellar, explained much of the foregoing, and also talked of his company's small horizontally-opposed four-cylinder engine, which has been developed and type-tested. It is of particularly attractive design, gives 150 b.h.p., and was first exhibited at the Paris Show of November, 1946. It was originally intended for the Safir but was not ready in time. Should sufficient demand arise, the unit could now be put into medium-scale production at short notice. Mention was also made of a high-powered 28-cylinder radial air-cooled design study which has, however, been superseded by gas-turbine projects.



Two examples of early Lysholm-designed gas-turbine units. The turbojet (above) is a wing installation suggested by Milo A.B., and the turboprop (below) is a Ljungströms Angturbin proposal.

Later the chief engineer, Mr. G. Gudmundson, personally conducted a tour of the works, which included an examination of the stripped type-test 150 h.p. engine (the components were seen to have stood up to the run satisfactorily), of units for gas-turbine designs, machining operations on the first Goblin components, and afterwards a tour of the several test beds and aerodynamic departments in which gas-turbine research is in progress.

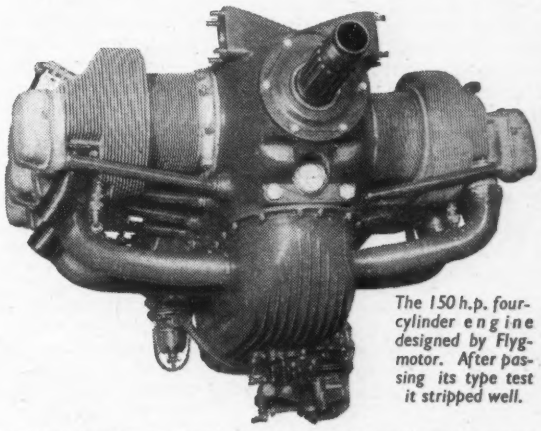
As one passes through the production departments, the first components of Goblin engines may be seen filtering through, and delivery of the first unit is scheduled for late autumn. To start with, impeller forgings will be sent from England, part-machined. The special milling machines required for the job are already overdue for delivery to Sweden. SAAB will produce the sheet-metal components in their large presses. Eventually, however, the whole unit will be produced by Svenska Flygmotor.



Special machinery is installed for machining Goblin impellers.

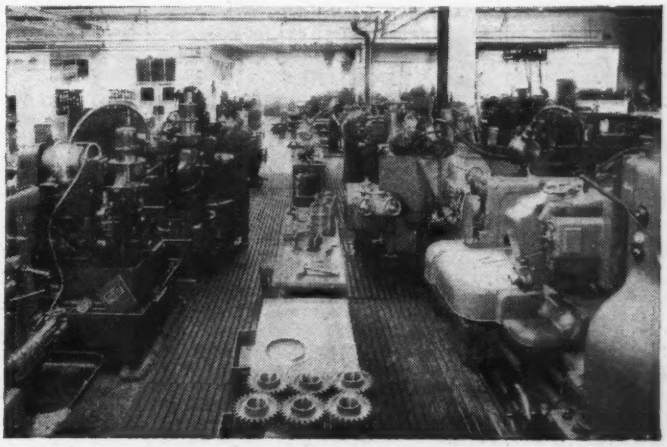
It is noteworthy that machines already installed will permit all threads for the Goblin to be rolled.

The company designed gas-turbine beds some time ago, and later, a comparison with those used by the de Havilland company revealed a remarkable similarity of ideas. The designs have now been translated into bricks and mortar, and a British Goblin is running on them to give experience.



The 150 h.p. four-cylinder engine designed by Flygmotor. After passing its type test it stripped well.

The Swedes are not a large nation, and therefore production orders cannot be expected to match those placed in some other countries. The productive capacity and high standard of equipment of their aircraft engine factory is, therefore, the more remarkable. M.A.S.



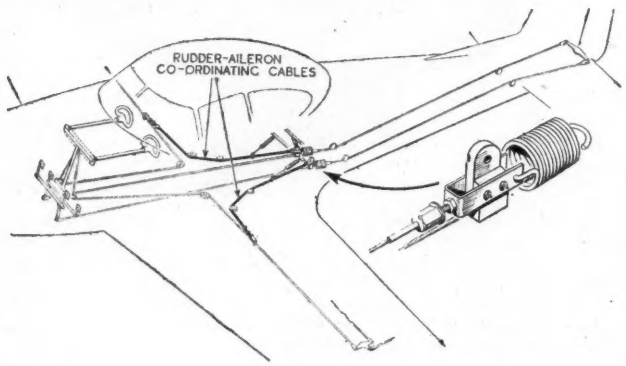
In the gear-grinding department of the Flygmotor machine shop.

NEW COMPROMISE for the NAVION

Two or Three-Control System For Use at Will

A NAVION FOR SWITZERLAND: *The normal ceiling of 15,600ft will not be too much for Alpine flying.*

A NOTEWORTHY step towards the simplification of flying in light aircraft is the system now fitted to the Ryan Navion to give full conventional foot and hand control at take-off or during aerobatics, and control by wheel alone for normal flying. In the past, attempts to eliminate the rudder pedals in aircraft have resulted in some success under normal conditions, but have been felt by many to lack the additional safety margin when taking off or landing, or, in fact, whenever rudder control might be required independently of the ailerons, as, for instance, in particularly turbulent air conditions and unusual attitudes. The Ryan system provides all three controls whenever required, but for normal flying the rudder pedals can be disregarded. Thus, when circumstances render it necessary, the rudder responds to slight pressure on the pedals, but for all other conditions of flight the interconnection between the aileron and rudder cables automatically accomplishes a limited movement of the rudder to co-ordinate a turn initiated by wheel (aileron) only.



The layout of the Navion two/three control system showing the co-ordinating cables, tensioning springs and fairleads.

A pilot with over 300 hours' experience of flying with the Ryan system reports that, in his estimation, he has not logged more than four hours' "rudder time" in all. With the businessman who uses his aircraft solely as a means of rapid travel and nothing else, the two-control system has proved very popular, making as it does for relaxation and comfort during flight. The additional safety of full rudder control is calculated to reinforce confidence of both novices and experienced pilots alike.

The co-ordination system now being fitted to the Navion is both light and simple. In addition to the normal three cable-actuated controls, two cable-and-spring assemblies intercouple the aileron and rudder cables on each side of the aircraft. These co-ordinating cables are attached to a large coil spring through which the rudder cable passes, fouling or friction being prevented by fairleads. The rear ends of these springs are attached to the rudder cables between the pedals and the rudder lever-arms. The foremost ends are connected by the co-ordinating cables to the aileron cables. Thus, with aileron control held in the neutral position, pressure on either rudder pedal will, by overriding the spring tension, produce the requisite rudder deflection. Alternatively, when no pressure is applied to the pedals, rudder deflection is caused by the movement of the aileron control cable being transmitted, via the co-ordinating cable and coil spring, to the appropriate rudder cable. Any slackness that may occur in the co-ordinating cables is taken up by means of small tensioning springs attached to the fairleads.

The technique of flying with the two-control system is claimed to be much simpler and easier to learn, and it seems that surprisingly short periods of instruction are sufficient to achieve proficiency. It may well be that the simplicity and lightness of this type of control equipment will go a long way towards achieving the desirable goal of "two-control" flying without in any way reducing the equally important safety aspect.

R.Ae.S. LECTURES

THE first main lecture of the Royal Aeronautical Society ever to be held at a Branch Centre will take place at the Birmingham Chamber of Commerce on October 6th; the speaker will be Dr. E. W. Still, B.Sc., A.C.G.I., A.F.R.Ae.S., A.M.I.Mech.E., and his subject "Some Aspects of Power Plant Development."

For November 20th the Society has arranged an all-day joint meeting with the Helicopter Association, which will begin at 11 a.m. During the morning session the general problems of the helicopter for civil use will be discussed. The operational point of view will be reviewed by W/C. R. A. C. Brie, A.F.R.Ae.S., A.F.I.Ae.S., and following this Capt. R. N. Liptrot will speak on the technical point of view. After lunch the session will consider the constructors' approach to the problem. Dr. J. A. Bennett, D.Sc., M.A., D.I.C., F.R.Ae.S., F.Inst.P., will lecture on the Fairey Gyrodyne from 2.30 until 3 p.m. and will be followed by R. Hafner talking on the Bristol 171 helicopter. J. S. Shapiro, Dipl. Ing., A.F.R.Ae.S., will begin his talk on the Cierva Air Horse at 3.30 p.m.

FORTHCOMING EVENTS

Aug. 18th to 28th.—Model Engineer exhibition, New Royal Horticultural Hall, Westminster.
Aug. 21st.—R.Ae.S. (Brough) and Brough Flying Club: Garden party and flying display. Brough airfield, East Yorkshire.
Aug. 21st and 29th.—International Aviation Week, Grenchen airfield.
Aug. 22nd.—Cowes Aero Club: Annual air display, Cowes airport, I.O.W.
Aug. 22nd.—All Herts Model Aircraft Rally, Radlett airfield.
Aug. 22nd to 29th.—Norsk Aero Klubb: Flying Week.
Aug. 26th.—R.Ae.S. (Glasgow): Lecturettes, Grand Hotel, Glasgow.
Aug. 26th to Sept. 11th.—Machine Tool and Engineering exhibition, Olympia, London.
Aug. 27th to Sept. 5th.—Aero Club de France. "Tour de France."
Aug. 28th.—R.Ae.S. (Graduate and Student): Visit to Vickers-Armstrongs.
Aug. 28th and 29th.—Cinque Ports Flying Club: International flying meeting, Lympne airport.
Aug. 28th and 29th.—Aero Club de Touraine: Rally, Internationale des Grands Vins de Touraine.
Aug. 29th and 30th.—Ghent Aviation Club: International Air Rally, Ostend.
Sept. 4th.—Northants Aero Club: Air display at Sywell. (Cancelled).
Sept. 4th.—Butlin's Week-end Air Rally, Speeton, Filey, Yorks.
Sept. 4th.—Bristol and Wessex Aeroplane Club: Air display, Whitchurch airfield, Bristol.
Sept. 7th to 12th.—S.B.A.C. Exhibition and Display, Farnborough airfield, Hants.

LIQUID-SPRING PROGRESS

Pioneering Work Now Bearing Fruit

DEVELOPED in close secrecy during the war, the principle of employing oil as the sole resilient element in undercarriage shock absorbers was conceived in 1938 by Mr. George Dowty, chairman and managing director of Dowty Equipment, Ltd. Hitherto it had been regarded as impossible to make practical use of the compressibility of oil owing to the extremely high pressures required to produce any useful degree of resilience, although the late Dr. F. W. Lanchester had foreseen the theoretical possibilities.

Visualizing the many advantages which could be gained if the formidable problems entailed could be solved, Dowty Equipment, Ltd., undertook experiments which culminated in the production of a revolutionary type of shock absorber unit, needing no air inflation but using oil both for cushioning and also recoil-damping purposes.

The first announcement of the Dowty liquid spring appeared shortly after the war (*Flight*, June 24th, 1946) and since that date substantial progress has been made by the Dowty company in this field of hydraulic engineering. The progress of the development period has fully satisfied, if not exceeded, the expectations of the designers, and that the majority of new aircraft are equipped with Dowty liquid-spring undercarriages is testimony to the popularity of the product with aircraft designers here and abroad.

Mr. Dowty has recently returned from America, where he found lively interest in the liquid spring for application in both the aircraft and automobile suspension fields. Because of this interest, and the dollar-earning possibilities of the oil spring, technical experts are to be sent from the factory in Cheltenham to America in the near future to follow up the many inquiries Mr. Dowty received during his visit there.

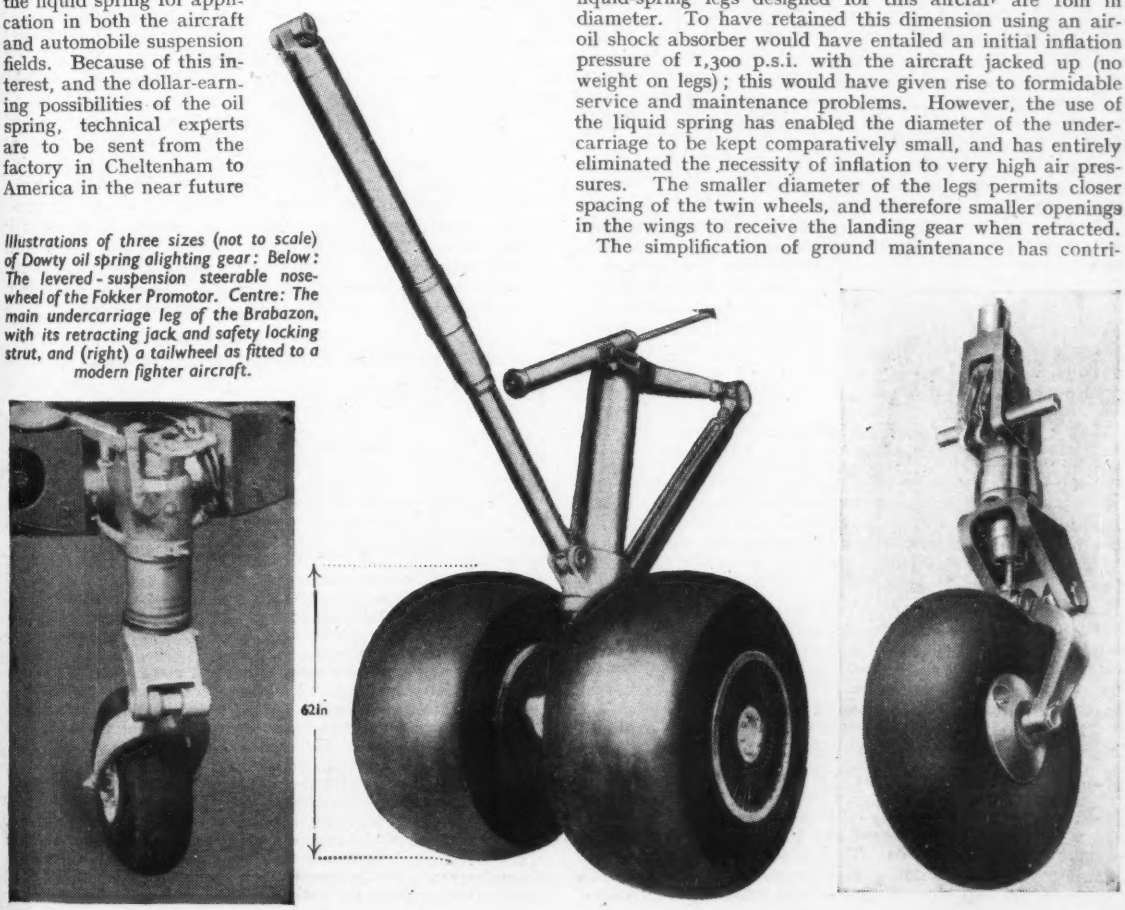
On the topic of American undercarriage design, Mr. Dowty expressed the view that the "drag strut" employed in certain American aircraft to absorb drag reactions when landing is a complicated and cumbersome method of tackling the problem. Moreover, even with the use of two shock absorbers, the drag-strut is only an attempt to cure the effects of bending; the pivoted trailing link, such as used on British "levered suspension" undercarriages, however, entirely prevents bending loads, with their attendant friction, reaching the shock absorber.

A number of important factors have contributed to the widespread interest in the liquid spring and to the progress made during the last two years. The modern trend of aircraft design being towards smaller and faster jet-propelled aircraft, space limitations demand the most compact form of alighting gear. Moreover, the high landing speed of modern aircraft requires that this compactness should not entail a sacrifice of efficiency. In the field of heavy transport aircraft, increases in all-up weight have necessitated a corresponding increase in the undercarriage inflation pressure when conventional oleo-pneumatic struts of the same size are used.

Maintenance Advantages

The Brabazon undercarriage illustrates this point. The liquid-spring legs designed for this aircraft are 10in in diameter. To have retained this dimension using an air-oil shock absorber would have entailed an initial inflation pressure of 1,300 p.s.i. with the aircraft jacked up (no weight on legs); this would have given rise to formidable service and maintenance problems. However, the use of the liquid spring has enabled the diameter of the undercarriage to be kept comparatively small, and has entirely eliminated the necessity of inflation to very high air pressures. The smaller diameter of the legs permits closer spacing of the twin wheels, and therefore smaller openings in the wings to receive the landing gear when retracted.

The simplification of ground maintenance has contri-



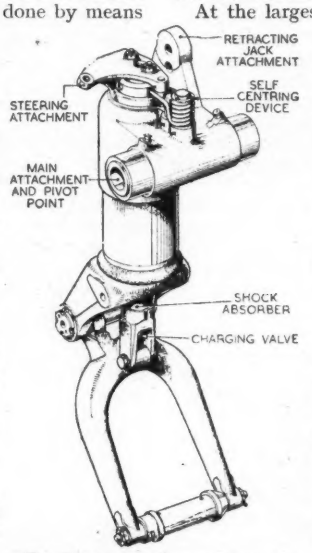
Illustrations of three sizes (not to scale) of Dowty oil spring alighting gear: Below: The levered-suspension steerable nose-wheel of the Fokker Promotor. Centre: The main undercarriage leg of the Brabazon, with its retracting jack and safety locking strut, and (right) a tailwheel as fitted to a modern fighter aircraft.

Liquid-Spring Progress . . . . .

buted in no small way to the adoption of the liquid spring for many modern transport aircraft. For example, a Bristol 170 has completed 2,000 landings without any undercarriage maintenance whatsoever. Indeed, the only attention that the oil spring shock absorber requires is the occasional topping up of the oil level, which is done by means of a grease-gun filled with hydraulic fluid. It is difficult to think of an aircraft that has not eventually, in the course of its development, had its all-up weight increased to a point far above the original figures visualized by the designer, and this applies particularly to military aircraft. In the case of the Meteor, for instance, with the increase of all-up weight the inflation pressure of the oleo-pneumatic struts has to be increased since space limitations preclude the enlargement of the undercarriage. A Meteor is at present undergoing tests with an undercarriage converted from air-oil to liquid-spring shock absorbers.

Thus the liquid spring is proceeding along precisely the lines foreseen by its designers, and here it may be said that the benefit of the intensive research which was carried out into the principle, design and manufacturing problems is now being felt. Before the liquid spring was "launched," every aspect of design and construction was closely investigated, with the result that all major and most minor difficulties were foreseen and catered for in the experimental stage. Consequently, "teething troubles" usually encountered when any revolutionary design first goes into actual service have been remarkably few.

Besides the very comprehensive test equipment employed in the experimental stage, careful attention is being paid to keeping up a high standard of quality in production units. In a thermostatically controlled standards room a Hilger projector, Zeiss comparator and a Taylor-Hobson Talysurf, to mention only a few of the high-precision instruments, are employed to ensure that a very high standard of surface finish and accuracy of components is maintained in production. The work of this standards room has thus played an important part in obtaining the freedom from oil leakage, wear and structural failures which, bearing in mind the high working pressures (about 50,000 p.s.i. is the normal maximum), have been a source of misgiving to many designers.



This illustration of a small levered-suspension nose-wheel shows the attachment of the shock absorber. An important servicing feature is that the liquid-spring unit can be detached without removing the leg from the airframe.

Research Results

Thorough and painstaking detail work has resulted in the solution of problems which only a few years ago would have been regarded as insurmountable. Furthermore, the knowledge gained by such research and instrumentation has been employed not only in bringing the oil spring to a high degree of reliability, but also in achieving greatly extended life and trouble-free service from other products of the company, such as hydraulic pumps, systems and components, power-assisted controls and the fuel pumps now being produced in large quantities for gas turbines. Hand in hand with this research programme has gone inquiry into the best types of synthetic rubber gland materials, upon which success depends.

These investigations are still in progress, as are also investigations into hydraulic fluids for use in the Dowty components. The successful outcome of these experiments is regarded as particularly important because, if satisfactory glands can be found for a new fluid which gives 3 per cent more compressibility, substantial reduction in weight can be achieved. At first sight 3 per cent extra compressibility may not seem a great deal, but it must be remembered that a reduction of the volume of oil necessary permits a reduction of cylinder diameter: the smaller diameter cylinder which would thus be made possible would not require such thick section cylinder walls as have hitherto been necessary to withstand the immense pressures encountered on full-deflection landings. The small extra percentage of oil resilience, it is claimed, enables the weight of the shock absorber to be reduced by 25 per cent with no increase of pressure or decrease of reliability.

At the largest end of the range of liquid-spring landing gears is the Brabazon. This undercarriage has now been successfully tested and satisfied the main conditions required. The performance with one tyre deflated and under high-drag conditions is now being tested on the Dowty drop-tower; the preliminary results of these secondary tests are well up to expectations. At the smallest end of the scale is the landing gear for the Fokker Promotor (designed for an all-up weight of 3,000 lb, i.e., 1/100th of the Brabazon's weight), recently demonstrated in this country.

Between these two extremes the number of British aircraft equipped with the liquid oil spring shock absorbers at present includes the Hawker P10-40, A.W.52, Bristol Freighter, the Avro Tudor, and the Westland Wyvern. Oil spring landing gear for the Avro Canada C.100 and C.102 is at present in the design stage, and in addition to these machines numerous other military aircraft are being similarly equipped, although for obvious reasons a list of these may not be published.

During the last two years or so the development of the liquid spring is by no means the only project on which the Dowty technicians have been engaged; fuel systems for gas turbines incorporating a much modified version of the "Liveline" hydraulic pump have been the subject of a great deal of research, and a Dowty fuel pump has been running continuously and without attention for close on 1,000 hours pumping pure petrol. Owing to the complete absence of any lubricating properties, this may be regarded as a remarkable technical achievement. An air compressor has also been evolved, capable of generating pressures up to 4,000 p.s.i. This again is no mean advance and may foreshadow the inclusion of high-pressure pneumatic systems in future designs.

REVERSING AIRSCREW CERTIFIED

FOLLOWING several hundred hours of flight testing, the Hamilton reversible hydromatic airscrew installation on the Convair 240 has been certified by the Civil Aeronautics Administration. The airscrews incorporate the latest developments in reverse thrust operating mechanisms, and are co-ordinated with the engine throttles. Full reverse pitch is secured in three seconds after the pilot has pulled the throttle back through idling into the reverse thrust position.

NEW PLASTIC MATERIAL

IT has recently been announced that De La Rue Insulation, Ltd., are now manufacturing at their new factory at West Chirton, North Shields, a sheet plastic called Formica (pronounced *For-mica*). Although the material—a melamine/phenolic-resin laminate—has been known for some years in the U.S.A., it is a comparative newcomer to this country. Intended primarily as a panelling and decorative furnishing medium, it is manufactured in thin sheets which can be sprung to fairly "tight" single curvatures, including those encountered in aircraft passenger cabins. It is particularly resistant to abrasion, a fact well demonstrated in Formica furnishings which had undergone the severe treatment imposed on them by the large numbers of troops who travelled in the *Queen Mary* and *Queen Elizabeth* during the war. A table-top, for example, after nothing more than cleaning up, was completely unblemished.

The product, including a cigarette-burn-proof type, is now generally available in the United Kingdom in a variety of pleasing colours and treatments.

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

SATELLITE STALLING SPEED

Fast Cruising the Chief Aim

WITH reference to the letter from Mr. L. H. W. Harris (August 5th) I am very interested in his remarks on the stalling speed of the Satellite.

It is not quite clear how he has arrived at these speeds, and I would like to point out that the designer's estimations of stalling speeds are 62 m.p.h. flaps up, and 59 m.p.h. flaps down, which is a reduction on Mr. Harris's figures.

When Major J. N. D. Heenan, the designer, carried out his survey of the requirements for this type of aircraft, he was forced to consider chiefly the overseas rather than the English market, and from his enquiries he came to the conclusion that a fast cruising speed was more essential than a low stalling speed.

I fully agree that from the private owner's point of view, in this country, there is a great desire to have an aircraft which is capable of "puddle-jumping," but unfortunately the British Isles as a market is extremely limited at present.

For the above reasons the Satellite is designed for long-range and weight-carrying ability rather than the ability to operate from very small fields; there is no doubt, however, that with the weight saving inherent in this method of construction, it would be possible to build an aircraft capable of superior performance in regard to a low stalling speed if the market appeared to justify it.

It should be stressed that our first and major policy at the moment is to prove the superiority of magnesium as a suitable metal for aircraft construction, and that once we have done that successfully, we can always turn our hand at a later date to the type of aircraft that Mr. Harris would seem to desire, with the sure knowledge that we should be superior to any comparable metal aircraft.

London, W.1. H. J. WILSON, C.B.E., A.F.C.
Director, Planet Aircraft, Ltd.

FLAT-FOUR LIGHTPLANE ENGINES

Development a Costly Business

WE are most interested to read the justifiable complaint raised by A.G.-J. Brown, of Dolgelly, in your July 15th issue regarding the almost entire lack of suitable light aircraft engines, but we would hasten to assure him and others interested that the matter is not being neglected, as he seems to believe.

While it is regrettable that several promising flat-four engines have been shelved, it is nevertheless a fact, and we thought it fairly well known, that steady, consistent and progressive development has been continuing for the last three years on the Monaco 100 h.p. horizontally opposed 4-cylinder air-cooled engine.

This aircraft engine is designed to ensure easy and cheap manufacture, and is also so arranged that the bulk of the components could be standardized on a horizontally-opposed twin, or horizontally-opposed, 6-cylinder unit. Development of any type of engine of this description is an extremely lengthy and costly process, and even at this advanced stage it is impossible for us to say *exactly* when production units will be available. However, in view of the fact that the majority of development work has been completed, and the design of practically all the components finalised, we *are* able to say that initial production will commence within the foreseeable future, and the fairly near future at that.

Mr. Brown's informant upon the costs of development of a light aircraft engine was certainly not understating the figure when he suggested £100,000. We have to date spent practically this amount of money, and somewhat naturally have continuously pressed the Ministries concerned to assist us with a development contract. There are, however, very good reasons why we have been unsuccessful, mainly that an engine of this size has little or no military significance, and development contracts are not normally issued for engines of less than 250 h.p. Also, with the advent and rapid development of jet and turbine units, there is some reluctance to spend more money on piston-type engines, whatever the size may be.

This, however, does not stop us from continually pressing the Ministries with our case, and the case of light aviation in general, and we have reason to believe that they are at last lending a kindly ear to our entreaty for assistance.

So far as the future is concerned, it is unlikely that our efforts will be shelved, in view of the fact that this company was specifically formed, the factory obtained and the plant installed, for the sole purpose of producing a light aircraft engine. Those financially interested in this undertaking are in a substantial way of business and have been manufacturing various types of internal combustion engines for the last quarter of a century; and they occupy a pre-eminent position in the petrol and diesel world.

It is unlikely that there will be any real progress in the design of light aircraft until the would-be designers and manufacturers are confident that there will be a supply of suitable modern cheap engines.

We have an enormous field of enquiries for this power unit, from at home and abroad, and although at the moment the prospects of selling light aircraft or light aircraft engines appears to be small, we feel this position will materially alter when these engines are actually available.

We believe that a 2-cylinder version of our engine would be suitable for ultra-light aircraft, and as a matter of fact a trial design is being progressed with this end in view. Those who understand the difficulties associated with this class of development will appreciate why we are unable, at this stage, to let more cats out of our bag, but we trust that the information given in this letter will give fresh hope to all those who have interests in common with our own, i.e., the furtherance of all matters concerned with light aviation.

Kings Langley, Herts. P. R. MONKHOUSE.
Managing Director, Monaco Engines, Ltd.

THE LARGE FLYING BOAT

"Flight" Accused of Using Phoney Arguments

IT can truthfully be said that over-enthusiastic proponents of a particular idea are liable to become so immersed in their subject that the arguments which they produce in support of it come out parrot-wise, and are repeated continuously over a long period of time, even though they may be no longer valid or even applicable.

So it is with the flying-boat protagonists. For years they have said their piece about the world being one big alighting area, about the ability of marine aircraft to force-land in the sea, about favourable passenger reaction, and about the obviation of the necessity to provide large and expensive runways.

Flight has continuously emphasized these points down the long year's of the flying boat's wane, and even if one could not entirely agree with its views, there was a glimmer of logic behind them all.

Not so the latest argument.

In a recent editorial *Flight* has gone on record as saying—in the midst of its loud rejoicing over the salvation of the SR45—that this aircraft will actually save the taxpayer's money because it will not require costly runways.

Now really!

If we were to abandon the Brabazon I and then say to all other countries, "Scrap your large aircraft, or at any rate don't bring them near us, because we're not going to provide any facilities for you," if we said that, then in spite of having to provide additional facilities at Southampton, and having to develop a safe instrument-landing aid for flying boats, to say nothing of extra route facilities, one might, at a pinch, have a case for saying that boats were going to save the country money.

But in actual fact the SR45 is going to cost the country a whole lot more than if it were a landplane, because we're going to have to duplicate at Southampton all the facilities which exist at London.

That is not to say that B.S.A.A. have been rash to choose the SR45, because of all the flying-boat routes, the one to South America gives the best promise of a successful operation.

But the justification of this must lie in the practical—and I mean "the way things are"—arguments and not in the rather phoney ones such as I have just mentioned.

Effingham Common, Surrey. DAVID BRICE.

SERVICE AVIATION

CAME THE DAWN —: Mosquito night fighters of No. 605 (County of Warwick) Squadron, R.Aux.A.F., ready for a day's flying during the Squadron's annual camp at Tangmere last month.

Appointments

THE Air Ministry announces the following appointments:

Air Vice-Marshal J. N. Boothman to be Air Officer Commanding Air Headquarters, Iraq, where he will take up the appointment during the autumn.

Air Commodore C. B. R. Pelly to be Assistant Chief of the Air Staff (Technical Requirements), Air Ministry, with the acting rank of Air Vice-Marshal, effective from August 17th.

Shooting Success

ROYAL AIR FORCE, Hong Kong, recently won the first Inter-Services rifle shooting match held in the Colony since the war. The R.A.F. team gained 20 points out of a possible 28, the Navy 18, the Army 17 and the Police 15.

V.R. and "Aux." Bounties

BOUNTIES payable to airmen (ground trades) of the R.A.F.V.R. and R.Aux.A.F. and airwomen of the W.A.A.F./R. List are to be increased forthwith. The compulsory training bounties of £5 for men and £3 10s for women are raised to £9 and £6 respectively. The amount of the increase, £4 (men) and £2 10s (women), may be paid immediately on satisfactory completion of the annual training period, whether this period is one or two weeks, and regardless of the number of hours non-continuous training completed at that time. The balance of £5 (men) and £3 10s (women) will be paid at the end of the service year, subject to the fulfilment of the conditions as at present laid down.

The increase in bounty is in respect of attendance at annual camp and will apply to those who have completed their annual training this year. Where, however, in exceptional cases annual training is carried out in short periods or has been commuted in whole to non-continuous training the increased bounties will be payable at the end of the service year, provided the training obligations for bounty for the year have been fulfilled.

Royal Air Force and Naval Aviation News and Announcements

Cooks for the King's Flight

FOUR R.A.F. cooks who have just completed courses at the R.A.F. School of Cookery, Halton, Bucks, have been selected to accompany the King's Flight of the Royal Air Force to Australia and New Zealand early next year. They are Sgt. Maurice Dodd, A/C. Vincent Jacques, A/C. Leslie Elliott, and A/C. James Laven. They were selected not only for their skill as cooks, as shown by their performances in the passing-out tests, but for their general interest in their trade, keenness and adaptability.

South African Liaison

A. CDRE. G. S. SHAW, formerly Air Officer Commanding, Air Headquarters, Burma, has taken up the appointment of Senior Air Liaison Officer with the United Kingdom Service Liaison Staff, South Africa. A. Cdre. Shaw was at the Air Ministry, in the Directorate-General of Manning, for over three years before going to Burma early in 1947.

Bringing in the Sheaves

ROYAL AIR FORCE stations are again to offer the greatest possible help to farmers in harvesting food crops this year. As many airmen as can be spared from Service duties will be made available. Farmers may also hire R.A.F. vehicles where their own or other local transport resources are insufficient. Members of the Service who in civil life were employed on farms or market gardens may be granted up to 28 days' special leave, without pay, to help on farms.

Canadian Conversion

THE formation of a Fighter Operational Training Unit for the R.C.A.F., at St. Hubert, Montreal, is announced. The O.T.U. is to have two main functions; pilots who already have their wings will be converted to Vampire jet fighters and will be trained in interceptor air defence operations, and training will be given to operations room control staff. Pilots will be posted to operational fighter squadrons on completion of the course.

The Hack Trophy

THE Hack Trophy, for the best all-round *ab initio* University Air Squadron pilot, was won for Queens, N. Ireland, by Cdt. J. A. McPherson on August 6th, at Halton. The judges were Air Marshal Sir Alan Lees, A.O.C.-in-C. Reserve Command; A.V-M. Sir Basil E. Embry, Assistant Chief of Air Staff (Training); and two experts from the Empire Flying School—S/L. R. Bailey and F/L. E. M. Sparrow. Runners-up were Cdts. R. C. Foote; Edinburgh (second); Brian Plenderleith, Cambridge (third); and P. E. Bottomley, Leeds (fourth), all of whom flew in the finals. The finals were flown in conditions of driving rain and low cloud, but were completed to time.

"Mercury" and "Iris"

"MERCURY II," the Avro Lincoln of the R.A.F. Empire Radio School, Debden, Essex, will leave Lyneham, Wilts, on September 1st for a six-week tour of the Middle East and Africa. She will carry a team of specialist officers headed by G/C. C. M. Stewart, O.B.E., who is in charge of the Liaison Section at the School.

One of the main objects of the forthcoming visit is to exchange ideas with the South African Air Force on radio training policy, and to discuss mutual problems and possible improvements in such training. Places to be visited include

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Fayid (Egypt), Aden, Khartoum, Nairobi, Heany (Rhodesia), and Pretoria. The liaison team will then visit several units of the S.A.A.F. *Mercury II*, which will be captained by F/L. M. Hoyle, is due back in the U.K. on October 15.

Shortly before the *Mercury* leaves the U.K., another team of R.A.F. radio specialists is due to return from an African flight. G/C. B. H. Boon, R.A.F. Inspector of Radio Services, and members of his staff are at present engaged on a tour of R.A.F. units in Africa and the Middle East to survey and check radio navigational aids and communication facilities. They are flying in the Lancaster *Iris*, which left the U.K. on July 27th and is due back on August 27th Their itinerary included visits to Malta, Tripolitania, Cyprus, Egypt, Iraq, the Persian Gulf, Somaliland, Nairobi and Khartoum. A.V-M. E. B. Addison, C.B., C.B.E., Air Officer Commanding No. 90 Group, R.A.F., is to join the party in Egypt.

Ex-Naval Ratings for R.N.V.R.

AIR maintenance and ancillary ratings who served in aircraft carriers and naval air stations during the war may now enrol in the Royal Naval Volunteer Reserve. Training facilities will be available at the following Royal Naval Air Stations: Culham, near Abingdon, Oxfordshire; Bramcote, near Nuneaton, Warwickshire; Stretton, near Warrington, Lancashire; and Abbotsinch, Glasgow. Each Air Station has an R.N.V.R. Air Squadron attached. Volunteers will be required to undertake a five year engagement, to perform 80 drills of one hour duration each year, and 56 days' training with the Royal Navy in periods of not less than 14 days during the five years. Compensation will be paid for travelling expenses between the homes of volunteers and the air stations to which they are attached. There will also be an expenses allowance and grants.

Applicants should write, forwarding service certificates, to the Commanding Officer of the nearest of the four air stations, whose Commanding Officers will arrange interviews and give further details. Men are required to enrol in the following categories:—(a) Maintenance ratings of airframe, engines, electrical, ordnance and radio categories; (b) ex-seamen ratings with the air non-substantive qualification of safety equipment, aircraft handlers and meteorologists and qualified meteorologists. Also ex-seamen ratings employed as aircraft handlers prior to the introduction of the non-substantive rate. These ex-seamen entries will be enrolled as naval airmen; (c) photographers and supply assistants air.

Royal Mail

THE Royal Mail air service from London to Balmoral Castle, on Deeside, began on August 6th and will continue daily during the Royal Family's residence. The service was inaugurated last year. A Viking of the King's Flight, stationed at Benson, and flown by W/C. A. V. Tacon, the King's pilot, takes the mail to Dyce; there it is transferred to helicopters, flown by F/L. Trubshaw and F/L. Lee, landings being made on a cricket field in the grounds of Balmoral Castle.

"54" Collects New Laurels

THE heavy programme of aerobatic displays and exercises by No. 54 Squadron in America, has gone off without a hitch, save for weather interference. After a formal ceremony of arrival at Mitchell Field the British Force was welcomed by General Stratemeyer, Commanding General Air Defence Command, U.S.A.F., in the warmest terms. Mitchell Field Base made every arrangement to ensure that when the squadron could relax they were royally entertained. Theatres and dinner parties rounded off energetic days of display and exercise work.

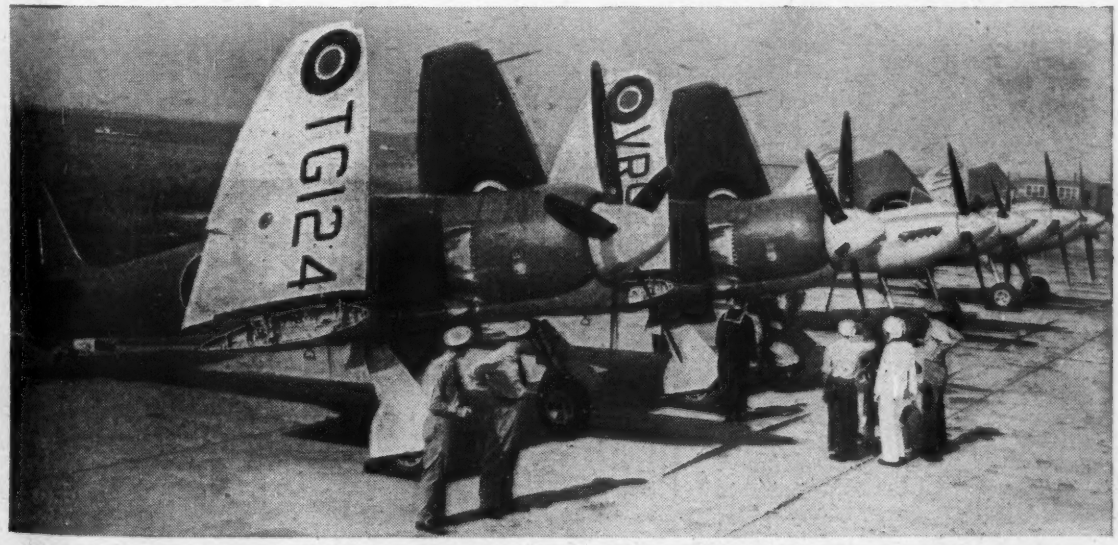
On August 7th, before the opening of the Idlewild International Airport exposition, four Vampires led by F/L. F. G. Woolley, D.F.C., were engaged in an interception exercise against B-29s. Sector Control worked perfectly and interception was made at 24,000ft seven minutes from take off. The Vampires contributed a polished aerobatic display towards the end of the day's flying programme. Bad weather caused the cancellation of flying on the following day —the U.S.A.F. Day at Idlewild—but on the Monday the Vampires were seen to greater advantage. Expert observers were much impressed by the fact that these were four of the six machines which had crossed the Atlantic, flown six thousand miles, covered eleven legs on journey, and done more than ten demonstrations without any technical hitch. Faith in the reliability of these aircraft was exemplified by the fact that no spare turbojets were carried.

At Langley Field, Virginia, visited by the Force before it came on to New York, Major Dyer, U.S.A.F. Base Operations Officer, flew a Vampire for forty minutes. On landing he declared: "This is the finest piece of machinery I have ever flown." He was much impressed by the lightness of controls and excellent manœuvrability.

The Cambridge Cockpit

ERRORS made by R.A.F. pilots who have been tested in the Cambridge Cockpit under different conditions during the past eight years at the Psychological Laboratory, Cambridge University, are analyzed in *Pilot Error* (H.M.S.O., 9d), recently published. Such errors are attributed to variations of "anticipatory tension" felt by a pilot anxious to achieve the standard of performance acquired from his training and experience. The report suggests that flying instructors should pay special attention not so much to how well a pilot can fly, but how his skill is upset when he encounters difficulties.

The Cambridge Cockpit is an apparatus specially designed and built for these experiments, and pilots undergoing tests (a form of instrument flying which was much more difficult than the real thing)



TOURISTS: *The Hawker Sea Furies and de Havilland Sea Hornets which, flown by Naval pilots, have been putting up such a fine show in America, are seen at Floyd Bennett airport, New York, where they were based for their participation in the International Air Exposition.*

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were required to "fly" certain courses on their instruments and to perform various manœuvres. Their reactions, when the "aircraft" did not behave as it should, were noted. The cockpit has a resemblance to the Link Trainer as used throughout the R.A.F.

A Crest for the Cox

IN recognition of the way in which Lerwick lifeboat turned out to pick up the crew of an R.A.F. Lancaster on July 23rd, A.V-M. D. V. Carnegie, C.B.E., A.F.C., has presented the coxswain, Mr. John W. Sales, with an R.A.F. crest. A.V-M. Carnegie said in a letter to the lifeboat crew: "The crest will remind you of our gratitude for your efforts and also let you know what a sense of comfort it is to us when flying over the sea, to know that your gallant crews are always ready to go to our assistance."

Missing-Research Unit Disbands

NUMBER 5 Missing Research and Enquiry Unit, R.A.F., which has for three years been tracing the fate of British airmen lost on wartime flights over Italy, the Mediterranean, Austria, Hungary, the Balkans and the Near East, has now been disbanded, having completed its task as far as is possible. It began operations in 1945 as Mediterranean/Middle East Missing Research and Enquiry Service. A small detachment will remain in Athens to clear up outstanding cases in Greece, and will endeavour to enter bandit-controlled territory where this can be done without undue risk. A liaison officer will be left in Rome to co-operate with the Imperial War Graves Commission and the American Graves Service. Permission cannot be obtained for search officers to enter Albania, Rumania or Bulgaria, but the British Air Attachés in the two last-named countries will investigate any outstanding cases there. In Rumania the work is virtually complete, and the graves of men of the R.A.F. and Dominion Air Forces are now located in the British cemetery at Snagov, between Bucharest and Ploesti.

By July 1, 1948, 19,756 men of the R.A.F., Dominions and Allied Air Forces missing from wartime operations had been accounted for. About 22,000 are outstanding, but between 12,000 and 17,000 are believed to have come down at sea.

One unit of the Missing Research and Enquiry Service is still actively engaged in Germany, where much work remains to be done, particularly in the Russian Zone.

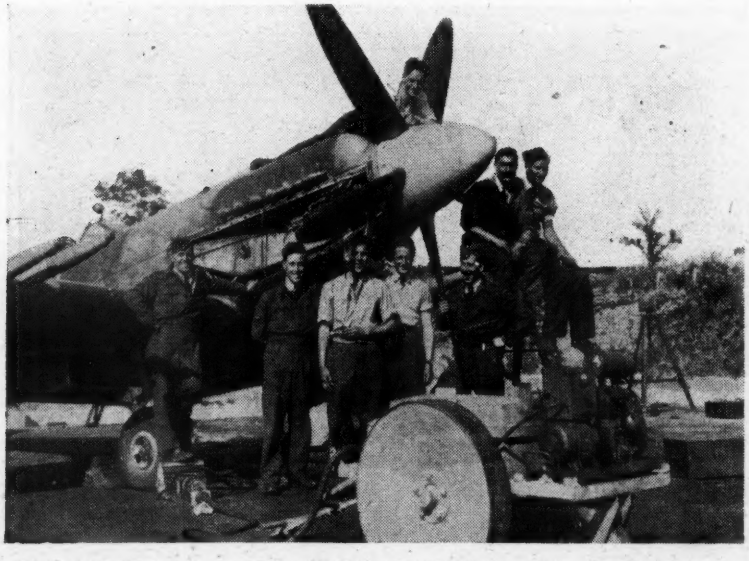
Midland A.T.C. Inspection

AT the height of a fierce heat wave, with the temperature so high that several of the boys fainted, Air Training Corps cadets from Lancashire and the Midlands in camp at Valley (Anglesey) R.A.F. Station were inspected at a ceremonial parade there on July 29th by Air Marshal Sir Alan Lees, Air Officer Commanding-in-Chief, Reserve Command. He was accompanied by Air Cdre. Vass, Air Officer Commanding, No. 63 (West and Wales) Reserve Group, Hawarden. The C.-in-C.'s aircraft was met by a R.A.F. guard of honour, and after a parade, the Air Marshal took the salute at a march past of over 500 cadets headed by the band of the B.S.A. (Birmingham) Works Flight. Among units represented were: 128 Squadron (Barrow-in-Furness); 1206 (Lichfield); 430 (Manchester); 113 (Edgbaston); 143 (Redditch); 1966 and 195 (Liverpool); 404 (Smethwick); 487 (Kingstanding); 1035 (Accrington and Haslingden); 274 (Bacup); 1453 (Ulverston); 471 (Millom); and 670 (Handsworth Grammar School).

Among the distinguished guests were the Lord Lieutenant of Anglesey (Sir R. H. Williams-Bulkeley), Col. W. E. Gee, D.S.O., Chairman of the Caernarvonshire and Anglesey Territorial Forces Association; Col. G. R. Newton, Menai Bridge, representing the R.A.F. Benevolent Fund; Group Commandant H. E. Matthews, Bangor, Royal Observer Corps; Councillor W. W. Cocker, M.A., O.B.E., J.P., of Accrington, a member of the Consultative Council of the A.T.C.; and the Rev. J. H. Williams, C. F. Rhoscolyn, honorary chaplain to Valley R.A.F. Station. Commanding the parade was W/C. K. M. Stoddart, officer commanding the West Lancashire Wing of the A.T.C., Fazackerly, Liverpool, and the Parade Adjutant was S/L. H. Proudlove, D.I.O. of the West Lancs Wing.

After the parade, the C.-in-C. inspected a composite A.T.C. Guard of Honour commanded by F/O. A. Denny, of the 128 (Barrow-in-Furness) Squadron. He left by air while the cadets were being given gliding and flying experience.

A DAY TO REMEMBER: Fifteen-year-old Cadet Escott, one of fifteen hundred cadets inspected by Lord Tedder at Halton on August 7th, learns that the C.A.S. is a very human person indeed.



SCOTS IN THE SOUTH: Ground staff of No. 602 (City of Glasgow) Squadron, R.Aux.A.F., ease up on the job during their summer camp at Tangmere to oblige the photographer. It will be seen that, like most Auxiliary squadrons, "602" is armed with Spitfires.

Reunions

THE next Lyneham Reunion will be a dinner for all ranks and their ladies at Williamson's Restaurant, 1-3, Grovelands Court, Bow Lane, E.C.4, on Friday, October 22nd, at 6 p.m. for dinner at 7 p.m. The price of each single ticket—obtainable from J. W. Hicks, 76, Southwark Street, London, S.E.1—is 10s 6d, dress optional. G/C. Guy Stanley Turner, C.B.E., has been invited to be the guest of honour.

Members of the Lyneham Reunion meet on the last Friday of each month in the Dive at the Chandos, St. Martin's Lane, W.C.2 (just off Trafalgar Square) at 6 p.m. Many old friends have met there for the first time since they left the Service.

* * *

THE third annual reunion dinner of No. 150 Squadron will take place at the Holborn Restaurant, Kingsway, London, on Saturday, November 27th, 1948. Tickets—price 16s—are obtainable from F/L. L. E. Hodgson (Treasurer), 33, The Fairway, Bickley, Kent. All enquiries, other than for tickets, including requests from those living outside London for overnight accommodation, should be addressed to the Hon. Sec., K. J. Holmes, 15, Connaught Road, Chingford, E.4.